McGRAW-HILL DIGEST

ENGINEERING • INDUSTRY • SCIENCE • BUSINESS

APRIL 1947

AMONG 172 ITEMS IN THIS ISSUE ARE:

SPECIAL FEATURES

Modern Finishing Methods.. 6
What Silicone Rubber Does.. 7
Aids to All-Weather Flying.. 9
Low-Cost Road 11
Microwave Heat May Help..12
Formula for Industrial Peace.17
Technical Shorts 20
What's Ahead in Power....22
Ways To Speed Production..25
Latest Highway Engineering.28
New Products 30
Latin America Industrializes.34
Argentine 5-Year Plan.....35
What's New in Aircraft....39

AVIATION

New Navigation Aid.....15
Short-Haul Airfreight Pays...26
Robot Flies Plane.....40
Also: 9, 13, 14, 17, 20, 24, 31, 39

CHEMISTRY

Foaming Sulphite Waste.....10
Plastic Fibers 13
Synthetic Soap Boom.....23
Also: 6, 7, 21, 23, 31, 32, 33, 42

CONSTRUCTION

Concrete by Dump Truck.....15
Model Safety Island.....29
New Bridge Technique.....37
Also 11, 17, 21, 24, 25, 28, 30, 42

ELECTRICITY, POWER

Sun Heat for Homes.....16
Avoids Switching Errors.....18
Heat Pump Saves Coal.....41
Also: 21, 22, 27, 29, 31, 32, 33, 36

ELECTRONICS, RADIO

Trichromoscope 20
Bright Television 32
Electronic Pill Counter 41
Also: 12, 15, 16, 18, 20, 26, 27, 30

FACTORY METHODS

Profit-Sharing Helps 10
Fast, Cheap Inventory 13
Scrap Conveyors Pay.....38
Also: 6, 14, 17, 25, 26, 30, 36, 40

FOOD PROCESSING

Keeps Vegetables Fresh.....19
Lecithin Improves Spaghetti..21
Protein From Molasses.....37
Also: 12, 17, 20, 30, 38, 40, 41, 42

MECHANICAL DESIGN

Beryllium-Copper Saves 14
Tuned Fatigue Tester.....28
Simple Flexible Coupling ...35
Also: 6, 7, 10, 20, 24, 27, 30, 33

METALWORKING

Advance in Welding..... 9
Quick Gaging by Air.....15
Versatile Machine Tool.....19
Nitriding Tools 23
Also: 6, 18, 21, 25, 30, 33, 35, 37

MINING

Efficient Mining Plan.....19
Fast Timbering Machine.....27
Flotation Cleans Coal.....29
Also: 12, 16, 17, 18, 20, 33, 37, 41

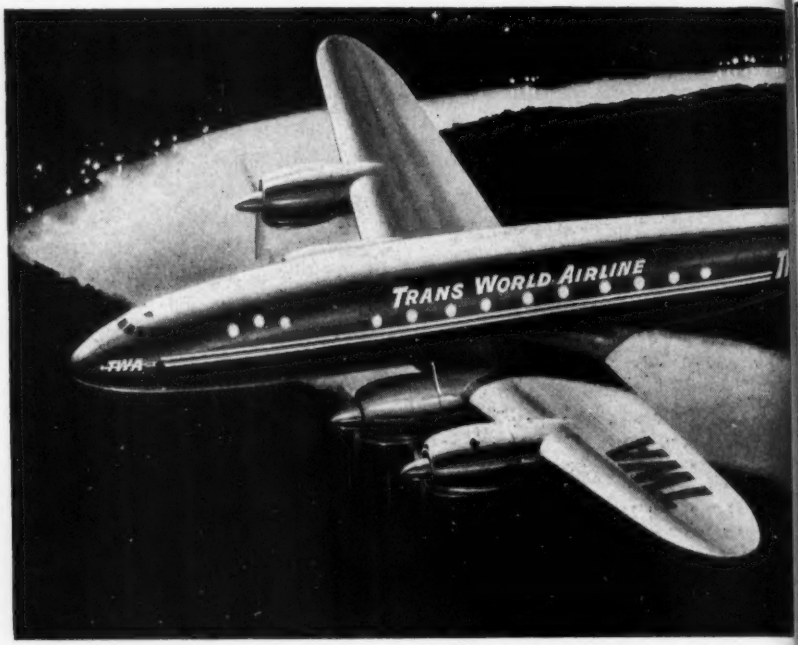
TEXTILES

Shrinkproofs Woolens 16
Better Wool Carding.....23
Knits Many Hose Patterns....41
Also: 12, 13, 17, 20, 21, 31, 32

TRANSPORTATION

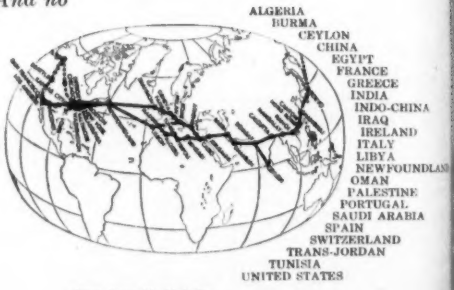
Bus of the Future.....26
Reduces Freight Damage....38
Truck Compresses Garbage...40
Also: 13, 16, 17, 18, 21, 24, 31, 41

International Review of New Developments



WHERE THE WORLD IS ONE

Above all nations, the world around, sky routes are fast and free. The world up there is everyone's world. And no one knows it better than your Starliner pilot and crew—for TWA Starliners fly more than 5,000,000 miles a month, up where the world is one.



TWA

TRANS WORLD AIRLINE

THROUGH LONG-ESTABLISHED relationships with leading foreign banks and an experienced staff, our Foreign Department provides its customers with a wide range of banking services, including current information on trade opportunities in overseas markets. You are invited to discuss your current needs with our officers.

BANKERS TRUST COMPANY

NEW YORK

Member Federal Deposit Insurance Corporation

Machine Tool Show

Plan, now, to attend the world's greatest metalworking show—at the Dodge-Chicago Plant, Chicago, Ill., U.S.A.

For the first time in twelve years, hundreds of new machine tools, forging machines, and other metalworking machinery and equipment will be on display—in full operation.

You'll have the rare opportunity of seeing the products of 250 leading manufacturers—all in one place and at one time. You may attend technical sessions at which papers will be presented by world renowned authorities on new developments in metalworking techniques and processes.

Ask the importers of American machine tools to give you complete information about the show, and for advance registration forms. Thomas Cook and Sons, American Express and other agencies can take care of your travel and hotel reservation requirements. Or, if you wish, write: National Machine Tool Builders' Association, Cleveland 6, Ohio, U.S.A.

SEPTEMBER · 17 to 26 ·

MT

BETTER MACHINE TOOLS · HIGHER PRODUCTION · HIGHER STANDARD OF LIVING

More Than 150 Digests Every Month On the Most Important New Technical, Industrial, and Business Developments

EVERY MONTH, the McGRAW-HILL DIGEST offers you more than 150 concise digests, many of them illustrated – in the fields of aviation . . . business, government, world trade . . . chemical, civil, electrical, mechanical, mining engineering . . . construction . . . electrical appliances . . . electronics . . . food processing . . . manufacturing methods . . . power generation and distribution . . . science . . . textiles . . . transportation . . . and others.

IN EVERY ISSUE, the "New Products" section describes and illustrates new and important mechanical devices, and improved equipment, for the manufacturing plant, construction job, transportation, etcetera.

IN EVERY ISSUE, the "Technical Shorts" section describes improved methods in manufacturing, processing, and materials-handling. One idea or suggestion, in this section alone, can repay the cost of your subscription many times over.

As a Subscriber You Enjoy These Privileges . . .

WHENEVER you, as a subscriber, are especially interested in an article in the McGRAW-HILL DIGEST, upon request our editors will furnish you with tear sheets of the original article as long as they are available, at no extra cost to you.

SHOULD you be interested in additional information on any of the equipment described in the "New Products" section, your inquiry will be acknowledged, and passed on to the manufacturer with the request that additional information be sent to you.

OTHER questions, not answerable in accordance with the methods outlined above, will be given careful attention by the editors.

How to Subscribe to the McGRAW-HILL DIGEST. . .

If you are not already a subscriber to the McGRAW-HILL DIGEST you can now subscribe by sending your order and payment to the McGraw-Hill Publishing Co., 330 West 42nd Street, New York 18, N. Y., U. S. A. – or to the McGraw-Hill Publishing Co., Ltd., Aldwych House, Aldwych, London WC2, England – or you can subscribe through your local bookstore – whichever is more convenient.

VOLUME 2 • NUMBER 4
APRIL, 1947

F. K. LAWLER, Editor
J. H. McKEE, Jr.
Assistant Editor
SHELBY McMILLION
Business Manager
FREDERIC C. THIEME
Advertising Manager

The McGraw-Hill Digest is published monthly by the McGraw-Hill Publishing Co., Inc., for circulation in all countries except the United States and Canada. Editorial and executive offices, 330 W. 42nd St., New York 18, N. Y., U.S.A. James H. McGraw, Jr., President; Curtis W. McGraw, Senior Vice-President and Treasurer; Eugene Duffield, Editorial Assistant to the President; Joseph A. Gerardi, Secretary. Address correspondence regarding subscriptions to J. E. Blackburn, Jr., Director of Circulation. *Subscriptions also may be ordered through local book dealer or McGraw-Hill's London Office, Aldwych House, London, W. C. 2.* Subscription rates: $5 for 1 year, $8 for 2 years, or $10 for 3 years; single copy, 50¢ (U. S. currency or equivalent).

COPYRIGHT, 1947, BY THE McGRAW-HILL PUBLISHING COMPANY, INC., PUBLISHERS OF AMERICAN MACHINIST • AIR TRANSPORT • AVIATION • AVIATION NEWS • BUS TRANSPORTATION • BUSINESS WEEK • CHEMICAL ENGINEERING • COAL AGE • CONSTRUCTION METHODS • ELECTRICAL CONTRACTING • ELECTRICAL MERCHANDISING • ELECTRICAL WEST • ELECTRICAL WHOLESALING • ELECTRICAL WORLD • ELECTRONICS • ENGINEERING & MINING JOURNAL • E & M J METAL & MINERAL MARKETS • ENGINEERING NEWS-RECORD • FACTORY MANAGAMENT & MAINTENANCE • FOOD INDUSTRIES • McGRAW-HILL DIGEST • MILL SUPPLIES • POWER • PRODUCT ENGINEERING • SCIENCE ILLUSTRATED • TEXTILE WORLD • THE WELDING ENGINEER

World News Offices: London, Paris, Berlin, Moscow, Prague, Shanghai, Bombay, Mexico City

Modern Finishing Methods

To guarantee future competitive position as to quality and cos manufacturer combines efficient methods with specially designed equipme

Lower costs and better quality are achieved by modern production methods supplemented by specially designed equipment in the porcelain enameling factory of Landers Frary & Clark. Automatic spray pickling replaces the usual vat method. Outgrowth of practices developed for cleaning shell cases, the pickling machine needs no attention other than loading, unloading, and changes in conveyor speed to suit the items in process.

The part is carried by an overhead monorail conveyor through a U-shaped tunnel where it passes in sequence through these sections: emulsion cleaner, rinse, alkali cleaner, rinse, sulphuric acid, rinse, nickel sulphate, rinse, neutralizer (soda ash and borax), and hot-air blast.

Besides a 50% gain in production, the installation, in which sprays impinge on the work from all angles as it passes through on a conveyor, has these advantages:

1. All soil, soap, drawing compound, rust, and scrap are removed from washing-machine tubs, range bodies, and other sheet-metal items. Etching is so thorough and uniform that less-expensive grades of steel can be used for porcelain-enameling purposes.
2. No in-process rusting or oxidation can occur. Work is kept wet until it reaches the drying oven, from which it emerges properly dried and neutralized.
3. Quality of pickling is independent of the human element.
4. Sheet metal receives a uniform coating of nickel sulphate. Iron deposits are avoided by continuous filtration to remove iron hydroxide sludge.
5. Fume-laden vapors cannot escape into the shop or atmosphere. Ventilating air, sucked into the acid and caustic sections of the machine, passes to two water-spray air scrubers, which discharge only moist air to atmosphere.
6. Maintenance charges will be low because of materials selected for the several sections of the machine and the ventilating method.
7. Materials-handling charges are reduced because the automatic spray pickling machi is set directly in the production line, not a remote location.

After pickling, parts are transferre by one man from pickling conveyor t ground-coat conveyor A at 1. Becaus dipping is cheaper for tubs and man flat range parts, these are picked off th conveyor racks and dipped in portabl tanks at 2, then rehung on conveyo Range cubicles pass to a ground-coa spray booth at 3. After ground coa ing, the ware passes into convectio dryer at 4, for which about 50% o

Porcelain-enamel finish coat is sprayed in air-conditio booths as washing machine tubs pass through on conve Fixtures also handle range cubicles. They can be rota by power while enamel is applied.

heat input is obtained from recuperators adjacent to the high-temperature, ware-firing furnace, the balance being supplied by oil burners.

Washing machine tubs are taken from conveyor A and passed into black-edging spray booth No. 1 at 5 then hung on furnace conveyor B. Other ware remains on conveyor A while it traverses black-edging booth No. 2 at 6, then is transferred to conveyor B, which has racks for both round and flat work, also range cubicles.

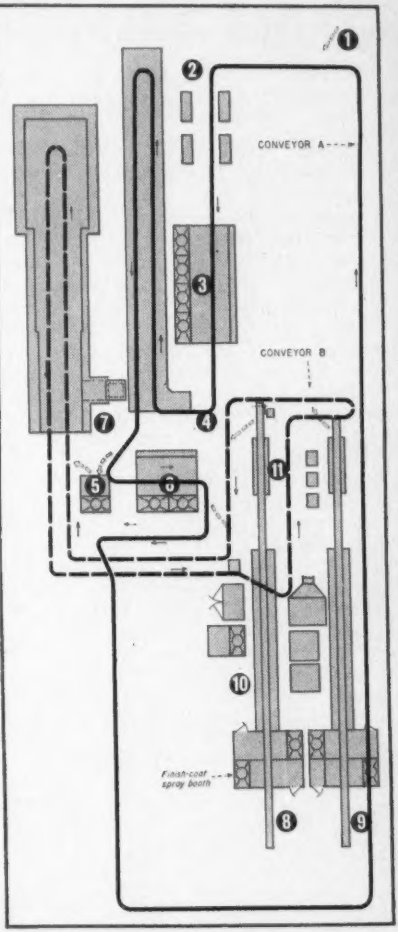
After firing in 1550°F. furnace at 7, ground coat ware is inspected. Material requiring a finish coat is transferred to shop trucks and transported to unloading stations at cover-coat spray booths at 8 and 9. Other parts are sent to storage.

Two types of conveyor fixtures were designed to transport work through the cover-coat spraying, drying, and brushing lines. Line 8 has a fixture for handling washing machine tubs and range cubicles. A pilot in top of fixture engages a hole in the bottom of the tub. Lugs on the ends of the fixture arms locate and hold range cubicles. Fixture can be rotated by power when spraying is in progress.

Flat pieces are handled on line 9. Here the fixtures have pins, or saw-tooth projections, on top to hold the ware clear for spraying the edges and avoid chipping the dry bisque when brushing the edges.

When washing machine tubs enter the spray booth on line 8, the first operator sprays the interior; a second operator, the exterior. After leaving the drying oven, the black edges are brushed on the run-out section of the conveyor, and the dry bisque is sucked into a grating by the downdraft and caught by Dynaprecipitors.

Conveyor fixtures are washed by water jets before traversing the return tunnel, water and enamel frit flowing into a sedimentation basin. Because of the cleanliness, reclaimed enamel can be re-used without addition of new material.



Work flow in efficient, high-quality enameling operation.

Brushed work from lines 8 and 9 is hung on conveyor B and sent to the high-temperature furnace for firing.

Spray booths are air conditioned, and makeup air for the gas-fired ovens is filtered. —AMERICAN MACHINIST

What Silicone Rubber Will Do

Solves design problems in wide range of equipment. Withstands heat, cold, pressure, and chemicals. Can be molded in any shape

Applications for which suitable materials previously were unobtainable are being engineered with silicone rubber. These include gaskets for a Navy searchlight, where the temperature ranges from —40°F. to 520°F.; other lighting units; baking and drying ovens (600°F.); aircraft assemblies near engine; oil seals on high-speed shafts; and turbo-supercharger, diesel engine, gas turbine, and air compressor units.

The resistance of silicone rubber to solvents such as alcohol and ethylene glycol, coupled with its heat resistance, has suggested its use in sealed cooling systems for automobile and truck engines. A cream separator gasket made of the material was still satisfactory after 680 hr. on field trial; the rubber gasket previously used swelled in contact with the milk and bound the shaft, increasing friction and overheating the gasket.

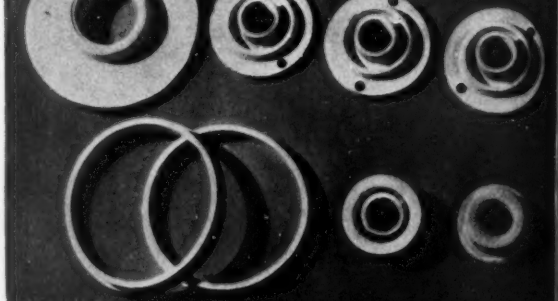
Used as a press pad in heat-sealing packaging materials, silicone rubber shows no noticeable change in flexibility or surface hardness. A similar application is in pressing sheet mica. Here the silicone rubber is laminated with layers of asbestos or glass cloth to form a pad which withstands heat and equalizes pressure. Even when hot, silicone rubber shows no tendency to stick to other hot surfaces. When flat rubber sheets are vulcanized between metal platens, a thin sheet of glass cloth coated with silicon rubber prevents the rubber from vu canizing to the metal.

Where high pressures are encountere flat sheets with reinforcing plies of gla fiber or asbestos are suitable. Gla cloth coated with silicone rubber on on or both sides by dipping or knife coatin is used as thin, strong gaskets an diaphragms in many industrial applic tions. Laundry firms see in it possibi ities for replacing the cotton clot padding used in much of their equipmen

Refrigerator manufacturers are i vestigating silicone rubber as a do gasket material because of its excelle aging characteristics, low compressio set, and the fact that it does not di color the white enamelled surface.

In high vacuum work, such as molec lar distillation, the simplicity of silicon rubber formulations is improving t performance of equipment. Where gasket has to be used at low vacuu

Silicone rubber is molded to any shape at 100-500 p



and high temperatures, the oil and other volatile components in natural and synthetic rubber formulations are drawn off and contaminate the product. Absence of plasticizing oils in silicone rubber obviates this difficulty.

Other developments under investigation are sponge silicone rubber, and sheets reinforced with metal cloth and nylon fabrics for special applications.

Silicone rubber can be compression-molded to any shape at 140-160°F. in 2-10 min. at pressures of 100-500 psi. It is extruded in a variety of shapes.

Both the partially cured molded part and uncured extrusions are baked for as long as 72 hr. to obtain final cure, with 6% shrinkage. —PRODUCT ENGRG.

Aids to All-Weather Flying

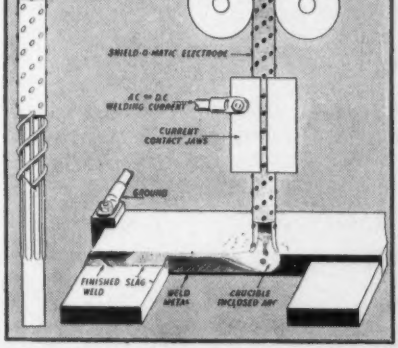
Army all-weather flying center believes answer lies in combined use of systems now developed. Radar control lands 45 planes per hr.

No single or final solution to hazards of all-weather fiying has thus far been found, and the U. S. Army All-Weather Flying Center believes the solution will lie in the combined use of several systems already devised. The Center reports that two systems have successfully passed operational tests—radar traffic control, capable of landing 45 planes per hr. on one runway on instruments, and microwave approach systems, which eliminate shortcomings found in the very-high frequency instrument landing systems (ILS).

Equipment for radar traffic control includes: 40-mile search radar, height finder, automatic direction finder, and vhf. communications equipment. Under this system, plane is contacted 30-40 miles from airport; direction finders locate plane and register bearing to plane on radar scope by line from port to plane. After identification, plane is picked up on a larger, flat scope, called a Skiatron. Skiatron controller brings plane to approach point about 12 miles from runway, where feeder controller takes over and lines plane up with proper runway. Ground Control Approach then picks up plane 6 miles out and lands it.

Chief advantages of radar traffic control are: (1) Elimination of stacking. (2) Positive identification and separation of planes. (3) Only airborne equipment needed is a two-way radio, and possibly a radar responding beacon. (4) Substitution of Skiatron scope and search radar for tower controller's eyes and memory. (5) Permitting a long, low approach to runway.

The microwave approach system is



ADVANCE IN WELDING — Advantages of manual shielded-arc welding and continuous automatic welding are said to be combined by the new flexible coated Shield-O-Matic electrode developed by Hollup Corp. It consists of a deeply grooved core rod wound with fine wires and coated with flux. Finned construction of core permits unusually high welding current, increasing rate of melting but not the temperature of the molten metal. Retarded rate of consumption of flux, compared with core, forms a crucible about the arc. —AMERICAN MACHINIST

essentially the same as ILS now in use, except that microwaves replace the vhf., eliminating bending caused by moving objects on land, steel hangars, other aircraft, and wet runways. System uses localizer, glide path, and marker beacons. First microwave set purchased cost $1,000,000, but it is believed that 1,000 sets could now be made for $5,000 to $9,000 each, compared with $30,000 per set for ILS. —AVIATION NEWS

PICTURES TAKEN, DEVELOPED, PROJECTED IN 15 SEC.

People were photographed as they passed through the door into a meeting room and their pictures projected on a screen before they reached their seats. This was achieved by a new automatic instrument developed by Eastman Kodak Co. Photographs are taken, processed, and projected on a screen in 15 sec. The instrument pulls a special 16-mm. film intermittently along a track inside a light-tight camera. At intervals, a photograph is made of objects before the lens. Meanwhile, a bottomless cup descends upon the exposed section of film, and a few drops of hot development and fixing solution are squirted in sequence on the film, which is then cleared by vacuum. Processing is completed at 140°F. in about 9 sec. The nearly dry photographic image is then pulled into the projection system; air pressure completes drying, cools film, and holds it flat for projection. —PRODUCT ENGRG.

FOAMING SULPHITE WASTE

Intensive aeration of heavy sulphite liquor waste, in contact with biological growth, brings liquor to a heavy foam, reducing the biological oxygen demand 80-85% in 24 hr. Oxygen demand is reduced 50% during first 6 hr. In aeration practices, without induced foaming, oxygen demand is reduced only 30% in 24 hr. Data on foaming method were obtained in tests at New Jersey Experimental Station. —ENGRG. NEWS-RECORD

BONUS, PROFIT-SHARING RAISE PLANT EFFICIENCY

Incentive and profit-sharing plans, instituted at Signode Steel Straping Co. in 1942, have raised plant-wide efficiency above 130% (1942 = 100). Standards have been applied to machine shop, rolling mill, slitter line, assembly, punch press, shipping room operations, and to formen. Foreman's bonus is based on total bonus hours of his department divided by the total actual working hours. The plan for foremen has increased the number of workers reaching bonus-level production, cut departmental overhead in salvage, repair, and extra costs.

Under the profit-sharing plan, employees may put from 2 to 4% of their annual earnings into a pool, to which the employer adds 15½% of his adjusted profits after taxes have been deducted. A portion of the employer's share is paid in company stock. Nearly all eligible share in the plan. —FACTORY

RUSSIA'S 1946 PRODUCTION

Twelve ministries were over their 1946 production goals in the report of the first year of Russia's fourth Five-Year Plan, but 15 ministries fell below expected goals. The current goals are pegged at or above the 1940 production figures. Top among ministries were meat and dairy at 110%; paper and cellulose reached 109%; agricultural machinery was low at 77%; transport machinery was next with 81%. Consumer goods were up 20% over preceding year.

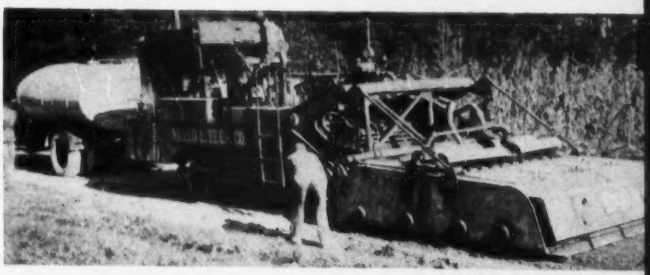
The year showed 6 blast furnaces, 15 open hearth furnaces, 9 rolling mills, 1 blooming mill, 11 coking batteries, 30 coal mines, and 117 power-station turbines completed. The Stalin Canal was finished; 300,000 spindles were added to Soviet textile mills; sugar refining rose 100,000 tons.

In former occupied territories, overall production was up 28%, with heavy industry up still more. —BUSINESS WEEK

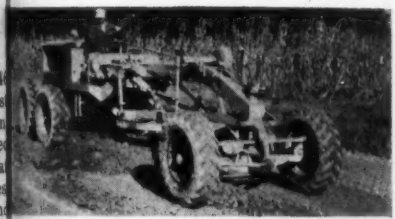
Low-Cost Road

Better soil-cement roads are built faster and at low cost by special equipment developed by a North Carolina contractor. —Construction Methods

1. Bulk cement is pulled from dump truck into hopper of specially built spreader. Wheels of spreader drive a 7-ft. wide belt that travels same speed as vehicle, so cement drops off belt onto road without flying.

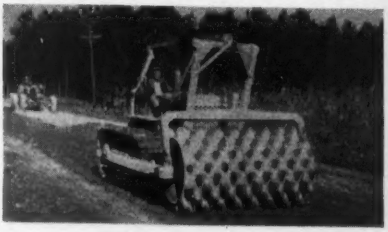


2. Cement is mixed with soil and water by a self-propelled single-pass P&H stabilizer which cuts 6 in. into top of grade. Water is supplied through spray bars from 1,500-gal. tank truck pushed ahead of machine. Stabilizer travels 5 to 28 ft. a min.

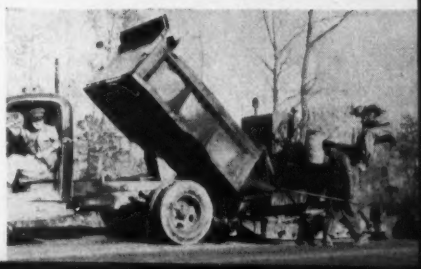


3. Following mixing by stabilizer, soil-cement is shaped up to road contour by grader whose small front wheels have been replaced with large tires. Scarifier on grader loosens any compaction before road is shaped up. A tractor-pushed, hydraulically controlled harrow works with grader to loosen top surface for subsequent rolling.

4. Surface is compacted by sheepsfoot roller on bulldozer frame. Feet are square to operate in either direction. Surface is dampened if necessary. Final compaction is by pneumatic roller which is weighted with sand ballast and pulled by a wheel tractor.



5. In 6-8 hr., grader clips surface. Then follows drag brooming and another pass with pneumatic roller. Final surfacing is 1-in. hot-plant mix applied by asphalt paver (right). Contractor substituted better hot-plant mix in place of special double-surface treatment at no extra charge. Final result is smooth, well-built, farm-to-market road that compares favorably with many more costly types.



Microwave Heat May Help

It may speed production of many processes and extend dielectric heating to applications not practical with conventional frequencies

Limitations in heating speed make many worthwhile applications of dielectric heating impractical, at conventional frequencies. Frequencies in the microwave region offer possible future solution to this problem if means can be found for generating sufficient power on a continuous rather than a pulse basis. Two tubes show promise, the split-anode magnetron and the resnatron.

How a cavity resonator might easily put power into rapidly moving thin sheet material, like textiles, plywood, and sheet rubber, is shown in drawing A. Use of a radar "bedspring" antennna to heat strip material is shown in drawing B.

Microwave heating may sometimes solve problems involved in curing or drying rayon, nylon, rubber thread material, and insulating coatings on wire. In the lumber industry, spot and edge gluing could be accomplished readily by concentrated fields made possible through use of openings in waveguide structures. Continuous bonding of plywood, not now achieved, might be done with microwave heat.

Preheating of plastics prior to molding in high-speed automatic presses is another potential application. Microwave energy piped through waveguides from one central generator to numerous press positions may be the future answer to the molder's present problems. At conventional frequencies, a central generator involves too many switching, matching, and voltage problems.

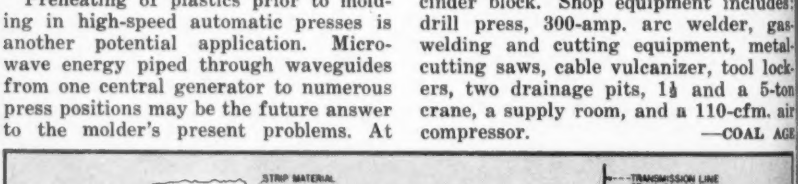
By concentrating extremely high frequencies through a waveguide "nozzle" it may be possible to bond or "sew" plastic and synthetic sheet materials at an unbelievable rate. With a flexible waveguide, the operation could be semi-portable.

Many production problems in the curing of rubber await solution by the use of higher frequencies. There also is need for higher frequencies in electronic heating of foods. —ELECTRONICS

UNDERGROUND REPAIR SHOP

Three miles below the surface at Independent Coal & Coke Co., is a repair shop which often completes work on machines and drills in less time than it would take to haul them to the surface shop. Surface shop handles all major overhaul work.

Underground shop is within a mile of the farthest working section. Floor of shop is 4-in. poured concrete; walls are cinder block. Shop equipment includes: drill press, 300-amp. arc welder, gas-welding and cutting equipment, metal-cutting saws, cable vulcanizer, tool lockers, two drainage pits, 1½ and a 5-ton crane, a supply room, and a 110-cfm. air compressor. —COAL AGE



Running continuous strip material through resonant cavity at an angle as at (A) gives uniform dielectric heating. At (B) is shown one possible way to use radar "bedspring" antenna for dielectric heating of moving material.

PLASTIC FABRICS WHICH RESIST CHEMICALS

Filter cloth, strainers, trays, conveyor belts, and other industrial fabrics now are made from Saran, a thermoplastic vinyl- and vinylidene chloride copolymer. These products are resistant to almost all acids, alkalis, and solvents, the principal exceptions being ammonium hydroxide and oxygen-bearing solvents like dioxane and cyclohexanone.

The fabric is produced in all the familiar weaves—and many special ones—from open screen cloth to tight satins, twills, and herringbones. Among the diverse applications are filter cloth in cider presses, reinforcing for the felt of a paper machine and for paper liners of shipping containers, drying trays, and bags in the cheese industry, storage-battery separators, coverings for blowers in corrosive atmospheres, and a conveyor belt in a phosphoric acid plant.

Being woven of monofilaments, the material does not absorb liquids, odors, colors, or flavors, and it can be cleaned easily. Tensile strength is about 47,000 psi., abrasion resistance excellent. It loses about 70% of strength at 200°F., softens at 240-280°F., shrinks above 150°F. —CHEMICAL ENGRG.

FAST, CHEAP INVENTORY

With specially designed inventory sheets and systematic rotation of inventory dates, Central Hardware Co. uses slack time for inventory, yet gets complete and detailed information. Complete inventory of every line is taken every 30 days. Separate inventory books are kept for each line, each book being dated to indicate the day on which that line will be checked. Spreading of inventory day assures even flow of inventory books to the warehouse and takes advantage of slack time in warehouse for checking, saving time and money. Actual inventory times vary from 2 hr. to 5 min. depending on line.

Inventory sheets are 17x11 in. Heading includes: name of supplier of line, supplier's address, sales representative, his address and phone. Left half of sheet contains a description of the item, discounts, price, shipping information, freight allowances, and routing. Right half is used for inventory, purchases, and receipts. Sheet covers one year's business. —MILL SUPPLIES

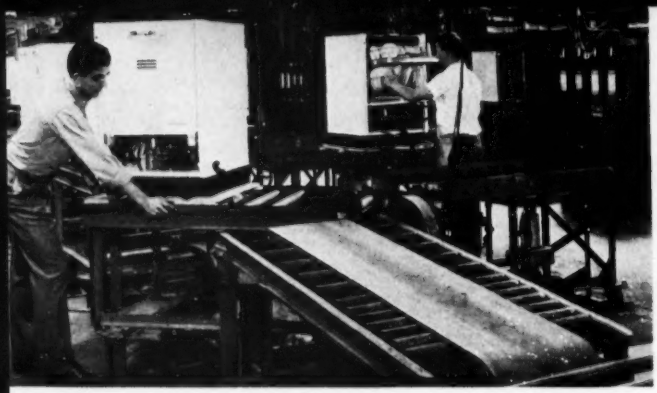
MODERN DESIGN—The "double monoplane" construction of this Delane DL240 will permit the plane to drop "parachute-wise" at the rate of 12 ft. per sec. Added wing gives 35% more lift. The 20-passenger prototype will cruise at 268 mph., land at 47 mph. Two 500-hp. engines in rear of fuselage will drive dual propellers at tail. Statistics: span, 36 ft.; length, 32 ft.; wing area, 322 sq. ft.; range, 1,160 miles; gross wt., 9,643 lb.—AVIATION NEWS

TEACHING DRIVER SAFETY

Reduction of bus traffic accidents is accomplished by the Nueces Transportation Co. through intense driver testing and training. The 1945 accident rate was reduced 48%, despite aging equipment. Testing begins with the initial interview. Where possible, personnel manager and safety director should be one man.

Before driver begins work, he is tested for observation, judgment, mechanical aptitude, reaction, steadiness, and depth perception. Fourteen days of school follow testing period, first four days spent in the classroom with standard training aids. The last 10 days are spent on the "skill test" ground driving. Here trainee is taught correct driving, importance of driver attitude, and self-restraint.

Once a month safety meetings are held, staggered so all drivers may attend. Periodic checks are made on drivers; each driver is rated every three months. Pay is on an incentive plan, based on safety. —BUS TRANSPORTATION



TURNTABLES AI TESTING—If 2-hr. running tests of dishwasher were performed on mai assembly line, productio flow would be blocked. H Hotpoint, Inc., installe 12 novel turntable co veyor sections in lin Dishwasher is moved onto a conveyor-top test stan and turntable is swung back into line. —AMERICAN MACHINIST

BERYLLIUM COPPER PARTS CUT COSTS, IMPROVE QUALITY

By taking advantage of the unusual formability characteristics and physical properties of beryllium copper, designers often can reduce total assembled cost of parts and at same time improve quality. Beryllium copper is corrosion resistant, has good electrical conductivity, high tensile and fatigue strength, hardness, and low stress-strain hysteresis. Parts made of it can be formed to smaller dimensional tolerances than can those made of any other material.

The 2% alloy, most commonly used, has the following composition: Be, 1.90 to 2.15%; Ni + Co + Fe, 0.50% max.; total impurities, 0.50% max.; Cu, balance.

The alloy is annealed at 1425-1475°F. for 2-3 hr., quenched in water and cold-rolled or -drawn to desired temper for subsequent forming to final shape. Further annealing is unnecessary except for severely bent or cupped parts.

Material in the ½-hard condition is used to fabricate most stampings. Coil springs usually are fabricated from wire in ¾-hard condition, which has better fatigue properties after heat-treatment. Formed stampings in which the radius of bend is less than three times stock thickness and wire shapes with sharp bends are made from annealed beryllium copper, which is easily formed. Parts requiring severe bending or cupping operations can be given intermediate anneals. Hard beryllium copper strip is used only in flat stampings.

Hardening is caused by metallurgical phase changes at 550 to 720°F. Higher temperatures relieve residual stresses. Stampings are made flat and bent to desired form in fixtures that hold parts to required dimensions during heat treatment. Coil springs are economically heat treated on winding mandrel. No warpage or springback occurs when parts are removed from fixtures. Hand adjustment is unnecessary. Inspection of only a small percentage of the parts is sufficient. High yield and tensile strengths prevent spoilage by rough handling and reduce replacement and maintenance costs. —PRODUCT ENGRG.

WING HOLDS FUEL

In the new Grumman Mallard 2-engine plane, 175-gal. fuel tanks are part of wings. Each tank is delineated by rib members, front and rear beams, and upper and lower skins. Stover-Mudge sealant (68% dispersion of thiokol, carbon black, and other ingredients in methyl-ethyl-ketone) coats all inner surfaces of tank with rubber-like film. Rib adjacent to hull side of tank has fume and fire seal; any leakage is trapped and drained overboard. Aft half of each wing tip float, also treated with sealant, provides extra fuel storage. —AVIATION

AIR-ENTRAINED CONCRETE DELIVERED BY DUMP TRUCK

Premixed, air-entrained concrete is now transported in standard or modified watertight dump trucks up to 15 miles. Trucks used to haul concrete may also be used by contractors for other hauling jobs on the project. Experience proves that air-entrained concrete can be mixed efficiently at a central plant and transported in dump trucks without segregation of the concrete.

Standard trucks used discharge 3-cu.-yd. load in 30 sec. New models are modified to chute concrete at a rate equal to high-discharge truck mixers. Light, maneuverable trucks will eliminate much wheeling of concrete at job site and will result in less damage to subgrades.

Lower costs will result to contractors through faster placing and finishing with air-trained concrete, more uniform concrete, and increase of 20-30% in concrete delivered with same amount of equipment. —ENGRG. NEWS-RECORD

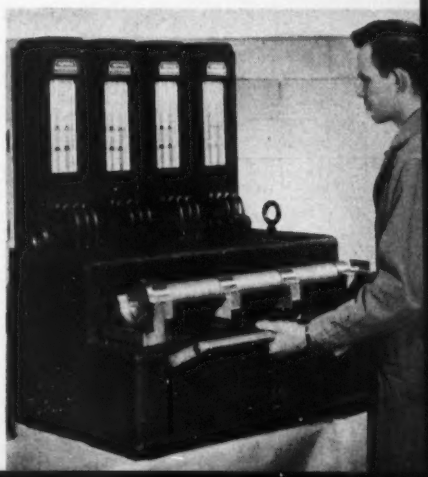
SOLVES AIR NAVIGATION AND APPROACH PROBLEMS

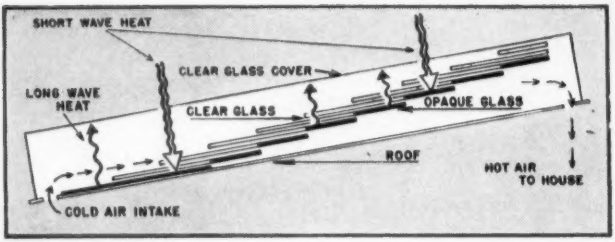
Solution of the airport problem of stack-ups of incoming and outgoing planes, as well as safe flight between airports, is promised by the Track Control Unit developed by Decca Navigator Co. Weighing 30 lb., the TCU receiver is used in conjunction with the Decca Navigational Aid system radio receiver, employed in Normandy to spot ships offshore. With this system, three radio transmitters send out constant signals. Receiver in plane actuates a red and a green meter, the meter readings being checked against a map overprinted with a lattice of numbered red and green lines. Intersection of proper red and green lines fixes plane's position. System is accurate to 30 ft. at 50 mi., 100 yd. at 300 mi.

Before takeoff, a roll of film marked according to flight tracks assigned, is inserted in the track control instrument. As long as plane is on course, indicator remains at zero. Should plane deviate from the assigned course, meter indicates deviation in 200-yd. increments. Film strip also is marked with several runway approach and circling orbit tracks. By setting indicator dial to track assigned, pilot flies as before until track is changed. Three windows on panel indicate miles to destination, ground speed of plane, and minutes ahead or behind schedule. Visual or aural warnings can be given pilot along route from controller.

Any number of flight lanes can be plotted to avoid natural hazards between airports. When plane arrives at fringe of airport control zone, controller can give pilot any one of several predetermined approach lines. If landing field is congested, the controller can assign a predetermined orbit around which plane may circle until the field is clear for a landing. —AIR TRANSPORT

QUICK GAGING BY AIR—All main bearings of an automotive crankshaft are checked in three places simultaneously with this air gage. Possibilities of multiple gaging by air are unlimited. One instrument simultaneously checks outside and inside diameters, concentricity, and bore squareness to one face. A special multiple air gage in an automobile cylinder block production line checks each of eight bore diameters at four levels and also reveals "out-of-round." —AMERICAN MACHINIST





SUN HEAT FOR HOME—Auxiliary solar heating unit for homes can cut fuel bills as much as 50%. Upper third of overlapping glass panes enclosed in a glass tray are coated with heat-absorbing paint. Sunlight warms the painted glass, but reradiated heat can not escape from the box. —COAL AGE

REDUCES BANDWIDTH FOR COLOR TELEVISION

New RCA system reduces bandwidth required for simultaneous transmission of three colors. High video frequencies produced by the three color chains are separated and combined, then transmitted over green radio-frequency channel, which has full bandwidth. Red and blue channels transmit only low-frequency components. As a result, fine detail of image is reproduced in shades of gray, and the broad areas are reproduced by low frequencies of the three channels in their respective colors. Technique is similar to that employed in color printing where black plate prints detail in shades of gray over three primary colors. A 525-line color image can be transmitted over a 12.5-mc. channel. —ELECTRONICS

NEW FOR THE HOME

For localized application of heat to muscles, General Electric's 7-oz., 15-watt, infrared heat lamp works on ac. or dc. power, and is good for 1,200 hr. Heat rays are beamed through a 2-in. circular opening. Case is ellipsoidal ivory-enameled aluminum . . . Set for wool temperatures, Steel Tite Corp.'s steam attachment can be affixed to any standard electric iron for pressing. Water tank, at front of iron, can be refilled during operation; tipping of iron stops steam. Steam is generated in 1-2 min.; sole-plate temperature remains uniform . . . Lejay Motor Corp. has developed a battery-powered lawnmower, operating 2-3 hr. before recharging. Unit includes charger, which plugs into standard 110-volt outle . . . Cutter arm, equipped with motor-driven router blade, is yoked to a pin-pointed tracer arm in the home tool de veloped by Dumore Co. to duplicate carv ings. It will cut plaster, plastic, metal glass, wood, and will duplicate drawing easily. —ELECTRICAL MERCHANDISIN

SHRINKPROOFS WOOLENS

Protonize, a new woolen shrink-proofing process developed by Alrose Chemica Co., controls slow liberation of chlorin to give desired degree of shrinkproofing and feltproofing. No special equipmen is needed, the process being complete in 30-40 min. at temperatures betwee 100-110°F. Applicable to wool stock yarn, woven or knitted fabrics, and cot ton and rayon wool mixtures, process im proves fabric wearability; leaves fabri with a soft, lofty hand, increases re sistance to abrasion; eliminates dange of felting; leaves wool whiter, ofte avoiding more bleaching.—TEXTILE WORL

EXPRESS EXTRA-FARE BUSES

Express extra-fare buses between Bosto and Worcester, Mass., make the 40-mil trip in 75 min. Started in July 194 the B & W Lines highway clippers hav been carrying full loads ever since. Sin gle express fare is $1.25, round trip $ compared with $0.95 and $1.75 on regu lar trips. Currently, the express is carry ing about 13,000 passengers per mont in two 37-passenger buses, a third read as standby. Buses run with seated pa sengers only. —BUS TRANSPORTATIO

Formula for Industrial Peace

Canadian Supreme Court judge bases labor peace on "union responsibility in return for union security." Acceptance gaining favor among unions

"Union responsibility in return for union security," Canada's latest formula for industrial peace, was handed down in a recent decision of the Supreme Court of Canada by Judge Rand. The "Rand Formula" takes a middle-of-the-road stand between open and closed shop and stresses the need for enlightened union leadership over completely democratic unions. The plan is gaining acceptance among the Dominion's unions and companies, and it is achieving a high degree of success.

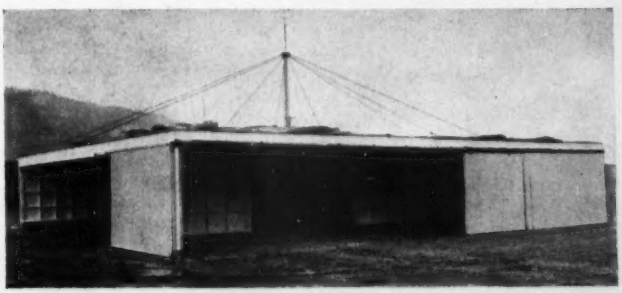
The plan is based on these premises: (1) a union must have financial security and have available checks to apply to "insurgent" membership. (2) The company needs uninterrupted production and guarantees against strikes in violation of its contract. (3) Workers must have the opportunity to seek and obtain employment regardless of their association with organized groups. The formula stipulates:

1. Open shop is retained—worker joins the union or not, as he sees fit.
2. All employees pay union dues, regardless of membership in the union.
3. Nonmembers are not to be assessed special union dues, fees, and fines.
4. All employees vote, regardless of union membership, in strike votes.
5. Strikes called by the union without a majority vote of the workers cancel check-off by the employer for 2 to 6 months.
6. Union must repudiate wildcat strikes within 72 hours after they begin in order to avoid suspension of the check-off. Picket lines during wildcat strikes must be declared illegal by the union.
7. Workers on strike in violation of contracts are fined $3 per day—fines being paid to the employer—and lose a year's seniority for each week while on such strikes.

Major objection to the formula comes from unions charging that payment of dues does not constitute sufficient right to participate in strike votes. Locals of the United Automobile Workers, United Steel Workers, and Mine, Mills, & Smelter Workers have accepted the "Rand Formula." —FACTORY

NEW TITANIUM PROCESS

Ductile titanium is being produced by reduction of titanium tetrachloride with molten magnesium in presence of helium under pressure in pilot-plant operation by U. S. Bureau of Mines. The new process is still expensive, but wide use of the light, corrosion-resistant metal may lower costs. With the new process, titanium will be available for industries where necessary properties outweigh cost. Pilot-plant operations are producing at the rate of 100 lb. per week.—BUSINESS WEEK



PREFABRICATED HANGER—With cable roof suspension, this 4-plane hanger is 56 ft. square, has 41¼-ft. doors, 28-ft. individual hanger depth, can be built in two days. Exterior walls are plywood, interior optional. Timber Structures, Inc., designed it. —AVIATION NEWS

BETTER LOCOMOTIVE — Simpler to handle, safer, and cheaper to maintain, a new 25-ton, 480-hp. mine locomotive travels 11.5 mph. on level track, pulling a gross load of 800 tons, 50% more than conventional locomotives; top speed of 40 mph. is possible. Four 120-hp., single-reduction, axle-mounted motors give equivalent to 19 hp. per ton of locomotive weight. Four-wheeled, two-axle swivel trucks are used.—COAL AGE

FAST WIRE-MESH WELDER

Wire mesh is made at high speed by the novel 25-electrode spotwelder developed by Thomson Electric Welder Co. As many as 25 longitudinal wires (14 to 0 gage) feed into machine continuously, spaced as closely as 1½ in., and transverse wires are welded to each. For diamond mesh or diagonal patterns, the entire bank of electrodes is moved hydraulically to right or left to weld succeeding cross wires. A worm and reversing motor drive electrode carriage across frame.

Current is applied to half of electrodes at a time, in rapid succession. Both pressure and current timing are individually adjustable for each electrode, and electrodes not needed during operation can be "blanked out." —WELDING ENGINEER

AVOIDS SWITCHING ERRORS

Complete wiring of the Wright Aeronautical Corp. plant is represented on a plywood panel to check switching operations before loads are changed and to train electricians for power substation work. Panel is mounted on a 32-compartment box, compartments representing various sections of the plant. As switching is done, small holes in the panel show the path of the current by means of small, tubular bulbs in the compartments.

Located in master control room, the panel carries the same setup as the master substation. Before a shift is made, the proposed change is run through the panel. In the 4½ yr. that the panel has been in operation, no errors have occurred, resulting in great savings through elimination of outages and damage to equipment due to switching errors. —FACTORY

MAGNETIC FILM TRACK

A thin coating of iron powder glued to film edge—$\frac{1}{16}$ in. wide on 35-mm., 0.08 in. wide on 16-mm. film—provides a magnetic sound track from which the sound can be erased easily to permit another recording, according to Armour Research Institute. Although slightly more expensive than standard optical track, savings would be realized through ease in editing, lack of processing required, elimination of much cutting. One copy of film could be used for any language track. With minor electrical and mechanical modifications, magnetic and optical tracks could be used interchangeably on the same machine. —BUSINESS WEEK

NEW IN AUTO BODIES

Among new developments revealed at the recent meeting of American Society of Body Engineers is a vacuum automobile window operator. Two pistons in common horizontal cylinder move steel cables to turn reels which operate cables that raise or lower window . . . Sharp-pointed, helix-shanked, tacks are driven by machine to fasten wood strip to tubular steel seat frames. No holes need be drilled . . . Steel-spring snap-on clips fasten upholstery to frame.—AMERICAN MACHINIST

EFFICIENT MINING PLAN

At its Monarch mine, Sheridan-Wyoming Coal Co. has increased recovery of coal from 50 to 65% through use of a new pillar-mining plan, using loaders and shuttle cars. The plan allows quick extraction in small areas, permits sealing at any time with minimum loss of coal, provides sufficient working places, and facilitates quick trip changes. In entry driving, panels are turned up and down the pitch from the mains, saving almost 50% of the entry driving, track, and wire. Headings are 12 ft. wide on 60-ft. centers; 150-ft. barriers are left along the main.

Panels are advanced up to and including the first right and left working areas, providing adequate working places when production equipment arrives. Production machinery continues driving panel entries and turning subs to maintain working places. Room length of 230 ft. has given best results.

Six rooms on 50-ft. centers form a working area, the first room being turned 100 ft. out from panel heading. Rooms are necked out 12 ft. wide and later cut to 22- to 24-ft. width; pillars are approximately 26-28 ft. wide, excavated later.

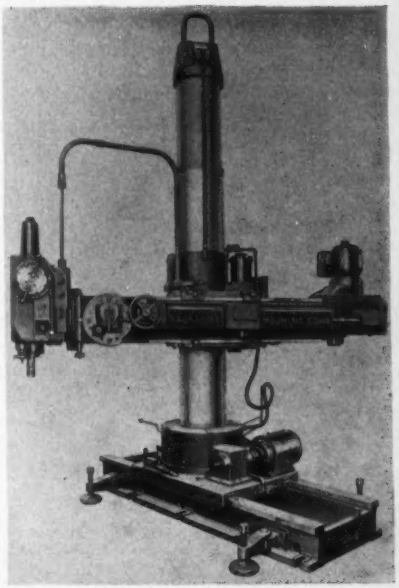
Track is laid on both right and left heading, connected at each sub-entry. Maximum shuttle-car haul is 650 ft. with 200-ft. rooms. —COAL AGE

KEEPS VEGETABLES FRESH

Soon to be put into pilot-plant operation by California Institute of Technology, a new method of preparing and packaging vegetables is expected to maintain freshness 60 days, possibly 90. Vegetables are first chemically washed to kill decay bacteria, then cooled and wrapped. Produce is kept chilled until picked up by consumer. —BUSINESS WEEK

CATIONIC FIBER SOFTENERS

Cationic softeners, through their affinity for negatively charged textile fibers, provide a firm, lasting bond with the fibers. The cationic activity is caused by the presence of a quarternary nitrogen radical, present either as a complex ammonia radical or as a member of a heterocyclic ring. The resulting finish is durable and not temporary, as with wax or oil softeners. Cation-active softeners lubricate, penetrate, and cover each fiber. They appear especially effective with synthetic fibers. With synthetics, they can be used in concentrations from ½ to 1%, except with resins. —TEXTILE WORLD



VERSATILE MACHINE TOOL—Operations performed by conventional radial and horizontal drilling and tapping machines are combined in this portable tool introduced by Kaukauna Machine Corp. It is possible to drill and tap at any angle in any plane within the limits of travel. The head swivels 360 deg. in either horizontal or vertical plane; headstock swivels 360 deg. on a trunnion which swivels 180 deg. in vertical plane. Spindle has 12-in. continuous travel; two rails supporting head and trunnion have 24-in. horizontal traverse. Rails may be raised and lowered by power and positioned to any point around machine. Work is held on indexing table on which it can be rotated. Column is on traveling base with 48-in. power travel. Spindle movement of 36 in. radially from center of column is possible.—AMERICAN MACHINIST

TECHNICAL SHORTS

Threads Made by Stamping—Production is speeded greatly and costs cut 50% by a new method of threading sleeves where close accuracy is not required. Threads for a hydrostatic fuse sleeve were stamped from cold-rolled strip steel, SAE 1010, 0.10 in. thick, edge-rolled to 0.446 ± 0.003-in. width, tapered on the ends, and coiled. After insertion in the steel tube, the threads were spot-welded for location then copper-hydrogen brazed. Toledo Stamping and Mfg. Co. developed the technique. —PRODUCT ENGRG.

Trimmer Raises Car Tonnage—Per car tonnage was raised 14% at Gay Coal & Coke Co. through use of a motor-driven trimmer. It lessens coal spillage, decreases necessary clean up, increases mine safety. A 5-hp. motor drives the trimmer, leveling plate moving back and forth across the car. Plate is not set under feeder. As empty car is filled, trimmer rakes coal into all corners. It is pushbutton operated. —COAL AGE

Lessens Propeller Noise—Addition of blades, decreasing propeller diameter, and turning propeller slower will decrease noise, according to NACA engineers. A 7-blade, 4-ft. propeller, turning 2,100 rpm., had a decibel rating of 86 at 30 ft., absorbing 48 hp. A 2-blade, 70-in. propeller, absorbing 40 hp., had a decibel rating of 107 in tests. —AVIATION NEWS

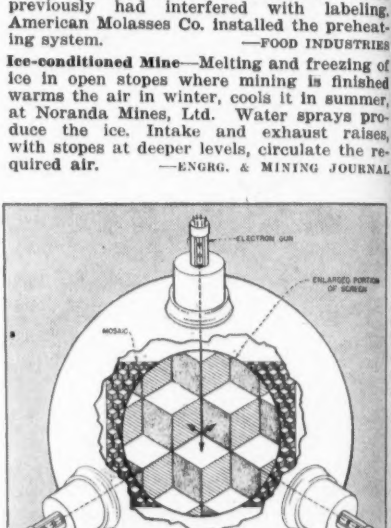
Microwave Spectroscope—Complex hydrocarbon molecules can be nondestructively identified by passing 1.2-1.6-cm. microwaves from a klystron oscillator through a 15-ft. waveguide containing the gas to be analyzed, then to a crystal detector. The gas selectively absorbs frequencies that are characteristic of its molecules. —ELECTRONICS

Visual Control—Plexiglas vats of 300-gal. capacity are used by Steiner Mfg. Co. for visual control of olive brine mixtures. Brine is mixed in lower vat, checked for color and quality; upper vat pumps brine to bottling operation. —BUSINESS WEEK

Wool Detergents, Scouring Oils—New synthetic detergents appear better than previously used soaps in resisting precipitation of lime or calcium compounds. The detergents will produce a much cleaner scoured product where lime or pulled wools are scoured alone or in blends. They may be used to good advantage in wet finishes of cloth. Detergents may be mixed with soaps. Mineral oil mixtures have successfully been removed from self-scouring oils for use with wool or worsted fibers. Tackiness can be supplied by use of colloidal silica. —TEXTILE WORLD

Infrared Stops Breakage—Breakage by thermal shock of cold glass jars when filled with hot molasses has been practically eliminated by preheating with eighteen 250-watt infrared lamps placed over jar conveyor line. The heat also evaporates condensate which previously had interfered with labeling. American Molasses Co. installed the preheating system. —FOOD INDUSTRIES

Ice-conditioned Mine—Melting and freezing of ice in open stopes where mining is finished warms the air in winter, cools it in summer, at Noranda Mines, Ltd. Water sprays produce the ice. Intake and exhaust raises, with stopes at deeper levels, circulate the required air. —ENGRG. & MINING JOURNAL



TRICHROMOSCOPE—New types of cathode-ray tubes for color television receivers are being developed at Allen B. DuMont Laboratories, among them the Trichromoscope. The screen is divided into equal rectangular areas, each area being coated by a different phosphor. Thus each picture element consists of three separate areas of colored phosphor. Three electron guns, each modulated by one of three color channels, scan the screen from different angles, activate different phosphors. Using a metal backing for the screen to prevent secondary electrons from one phosphor from exciting adjacent phosphors of other colors, prevent loss of back light, and conduct away the charge from the screen, 600-ft.-lamberts of directed brightness are expected from the tube. In cutaway view of tube, mosaic is not to scale, and center section is very greatly enlarged. —ELECTRONICS

Locates Bad Weather for Pilots—An airborne infrared warning device measures the distance to and moisture content, intensity, and turbulence of clouds, warning pilot of bad weather ahead. The device was developed by the National Advisory Committee for Aeronautics. —AVIATION NEWS

Automatic Highway Striper—To paint broken markings along center strips of highways automatically, N. Y. State Highway engineers use cam-controlled paint gun. Length of strip can be regulated by a variable-speed drive connected to a wheel running on the pavement. A truck pushes the striper and carries the air compressor and paint storage tank. —ENGRG. NEWS-RECORD

Penicillin Discovery—"Impurities" found in many batches of amorphous penicillin are now known to contain an unidentified substance which increases the potency of the drug as much as 100%. Food & Drug Administration doesn't believe that this discovery will eliminate the use of the more pure crystaline drug, with which dosage can be closely controlled. —BUSINESS WEEK

150% Overvoltage Tests—In testing windings of electrical machinery during overhaul, Southern California Electric Co. found 150% overvoltage effective. —ELECTRICAL WEST

2 Detroit Developments—(1) Carbide slitting saw 0.006 in. thick. (2) Inertia absorber for flywheels on machine tools using milling or fly cutters. It smooths shocks to give uniform cut despite variations in stock or cutter action. —AMERICAN MACHINIST

Lecithin Improves Spaghetti—The addition of 0.5% lecithin to spaghetti as a premix improves the appearance of the produce. Oxidation of pigments is retarded, resulting in greater retention of yellow, and product is smoother. —FOOD INDUSTRIES

Preferred for Tire Cord—Fiberglas and brass-coated steel wire possess preferred qualities for tire cord over other materials, according to tests run by the Textile Research Institute. Tests were conducted on cotton, rayon, nylon, Fiberglas, and wire. —TEXTILE WORLD

Versatile Welding—With aluminum-bronze electrodes, cast iron can be arc-welded to steel, steel or cast iron to bronze, brass to copper, and bronze to nickel alloys. Also, a high-strength bronze overlay has been applied to valve seats and to steel for bearings. Forming and drawing dies have been overlaid. —WELDING ENGINEER

Lights Plane Approach Lane—High-intensity approach lights, spaced 100-200 ft. apart, have been tested at the Landing Aids Experimental Station, prior to installation at Newark airport. At outer end, approach strip is 700 ft. wide, decreasing to runway width at other end. —AVIATION NEWS

PLAID TIRES — Soft white rubber strips perpendicular to the tread create hundreds of separate tread blocks for safer, quicker stopping and easier riding, at same time improving tire appearance. U. S. Rubber Co. developed the tire.—BUSINESS WEEK

Seawater Plating—Fresh-water tank interiors are being electroplated with seawater by a leading Clydebank shipbuilder. New tanks are filled with seawater and subjected to a 10-volt, 200-amp. current for 48 hr. through carbon electrodes. This deposits magnesium chloride as a lining. —AMERICAN MACHINIST

Hardware Heats Power Lines—Current magnetizes malleable iron hardware supporting an electric power conductor, causing hysteresis and eddy current losses large enough in some cases to heat the conductor and restrict current capacity. Substitution of nonferrous parts is practical. —ELECTRICAL WORLD

Diamond Trick—Diamonds mounted in intersecting metal circles, squares, or triangles look larger, more brilliant. A ½-carat diamond appears as full carat size. In "Illusion" setting, developed by Warren Piper, the mounting metal is wide at base, narrow at top. —BUSINESS WEEK

Plastic Helicopter Blades—Experiments are being conducted at the Cornell Aeronautical Labs. on a helicopter rotor blade made of glass cloth dipped in a special plastic resin. The 24-ft. blade is said to be lighter than standard blades. —AVIATION NEWS

Skin Remover—To take heat-treating "skin" off hardened fuel-injection parts before grinding, a Massachusetts plant uses sand-blast, reports "enormous" savings in grinding-wheel costs. —AMERICAN MACHINIST

For Riders' Comfort — Backs of new coach seats on the Great Northern Railroad will drop down to form a padded leg rest for night riders. —BUSINESS WEEK

What's Ahead in Power, Light

Electrical engineers see electrostatic power generation feasible. Ways to improve lamps discussed. Distribution improvements reported

Economic production and utilization of electricity at extremely high voltages and very low amperages are definitely within the range of possibility. This and other developments in electric power and lighting were discussed at the AIEE winter meeting in New York.

Electrostatic generators would require no magnetic circuit, and the mechanical design would be quite simple. The big problem is insulation. High vacuum appears presently to be the most promising solution, and laboratory experiments are underway. These investigations may result in electrostatic generators and motors equal in compactness to present electromagnetic machines. Looking even further into the future, there is a possibility of direct production of electricity from nuclear fission without the intermediate heat cycle.

Alloying of tungsten incandescent lamp filaments, and possibly case-hardening of the surface, may permit operation at higher temperature, with greater light output. Using krypton in the bulb instead of nitrogen would increase efficiency about 20%, but at 6 or 7 times present lamp cost. Other possibilities for improving lamp efficiency are increasing gas pressure inside the bulb and incorporating fluorescent effects to push infrared radiation into the vision range.

There is a wide area for exploration in the production of light from metallic vapor arcs. Compounds of magnesium and aluminum oxides with a higher melting point than the quartz used in mercury arc lamp tubes may permit operation of the arc at higher temperature to increase light output. So far, however, sealing problems encountered with tubes of these materials have not been overcome.

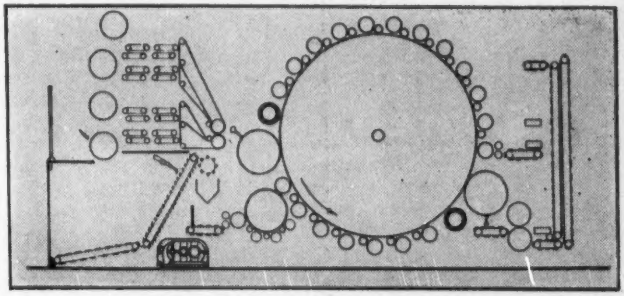
Definitely coming in fluorescent lamps is elimination of starters, and improvements are on the way in lamp, ballast, and fixture design which will greatly reduce sensitivity to low temperatures.

Solidly grounded neutral in conjunction with ground relaying on power circuits in one Eastern city has cleared faults rapidly and allowed higher rating for the overload relays. A midwestern utility uses instantaneous phase and ground relays with overload relays for backup, and has reduced fuse blowing from an index of 66 to 14 with proportionate increase in circuit breaker functioning.

In reducing urban power line outages, improved covering is reported more effective than anticipated. New fast-opening reclosers promise gains, and the one-cycle, short-circuit trials are indicating progressive benefits.

Simplicity, high sensitivity, and ability to detect incipient faults are cited as advantages of a gas-actuated relay

ACCORDION CONVEYOR—Extendable from 35 to 100 in., and capable of being formed quickly into practically any shape, a new portable conveyor developed by Food Machinery Corp. is a handy materials-handling unit. A section can be turned over and pushed on its rollers to a new location. —FOOD INDUSTRIES



Large cylinder diameter of this wool card cuts fly and produces better carding as path described by cylinder is closer to a straight line, giving less abrupt separation of stock and less fiber damage.

(Buchhobtz principle) for transformer protection. The relay is actuated either by the accumulation of gas liberated from insulation as the result of an incipient fault or by gas pressure in event of a short circuit. Operation is reported to be as fast or faster than differential relay protection. —ELECTRICAL WORLD

LIQUID NITRIDING LENGTHENS TOOL LIFE

Nitrided by the liquid-salt procedure, high-speed-steel tools attain a hardness and wear resistance, a relatively low coefficient of friction, and a good resistance to softening at elevated temperatures. Ammonia-gas nitriding is time consuming and causes brittleness by concentrating nitrides on the steel surface. It may be used, however, on some die work where brittleness is not a factor, or where a deeper case is required.

Greatest benefits of liquid nitriding are obtained on light-cut tools—chasers, taps, reamers, form tools, and broaches. It benefits dies, and sometimes improves milling cutters and counterbores.

The hardened, tempered, and ground tool preferably should be preheated in a neutral salt bath or air convection furnace to 1000-1050°F., transferred to nitriding bath at 1040-1050°, and held 20-30 min. Tool is then air cooled, washed in warm water, and dried. Nitride bath is 60-40% mixture of sodium cyanide and potassium cyanide, respectively. —AMERICAN MACHINIST

BETTER WOOLEN CARD

A 96-in. cylinder on the New England Machine Works wool card reduces fly at higher speeds and produces better carding. Cylinder rotation is downward from the feed; the 6 sets of workers and strippers, a fancy, and a doffer serve as the breaking section. Sliver is taken off the cylinder at the far side, is carried up and doubled on apron, and then is fed back to the cylinder through feed rolls and a lickerin. Upper section of the cylinder serves as as the finisher. The cylinder, workers and strippers, fancies and doffers are chain driven. A Bramwell feed is used with tape condenser mounted above it.

Card, of welded steel and aluminum construction, is 72 in. wide, 21 ft. long, weighs 20,000 lb. —TEXTILE WORLD

SYNTHETIC SOAP BOOM

First manufactured for industrial use, synthetic detergents have become important as ingredients in household soaps and cleaners. From less than 15,000 tons in 1941, U. S. production capacity, at the end of 1946, had grown to some 200,000 tons a year. A substantial tonnage now is based on petroleum, and much of the future expansion (ultimate annual capacity has been estimated as high as 500,000 tons) will be petroleum derived. As much as 50% of soap requirements may be met by products containing synthetic detergents. —CHEMICAL ENGRG.

FIRE PRECAUTIONS FOR PLANES, HANGARS

High on the list of fire-safety measures needed in aircraft are improvements in fire walls of engine nacelles, use of fuel shut-off valves, fire-resistant cabin and baggage compartment linings, curtains, and upholstery. For principal protection of interior spaces, airplanes should carry water extinguishers. Water is the approved extinguishing agent for carbonaceous materials, a wide variety of which are present in passenger and cargo compartments. Carbon dioxide and carbon tetrachloride extinguishers should be supplemented with water extinguisher to quench smoldering ash. The British have developed a lightweight aluminum water extinguisher, a small amount of Prestone being added to the water to prevent freezing.

As a result of intensive study of aircraft accidents and crashes throughout the war, the British have adopted these fire-prevention methods:

1. Engines be equipped with own fire-protection equipment.
2. Accessories forward of firewall to be flameproofed.
3. Extinguisher system to operate automatically in event of crash landing.
4. Discharge of extinguishing agent relative to engine stopping be automatically timed and controlled.
5. Methyl bromide as preferable extinguishing agent.
6. Lightweight, hand-operated water extinguisher to be used in cabins.

The British also show a preference for locating methyl bromide cylinders aft of the nose to protect the fire-fighting system in event of serious nose damage. Otherwise, toxic fumes might be released into the passenger cabin.

National Fireprotection Association stresses the need for hangar sprinkler systems. Unsprinklered hangar fires average $309,000 damage per fire, while fires in hangars with sprinkler systems averaged $2,000 damage per fire, over a 20-year period. Automatic sprinkler systems should be augmented by portable fire-fighting equipment, dry powder, carbon tetrachloride, or carbon dioxide units being advocated.

In fighting airport crash fires, water fog is particularly effective and is finding increasing favor. It is formed by forcing water, under high pressure, through nozzles that produce millions of droplets with great total surface area for heat absorption. —AIR TRANSPORT

HIGH-STRENGTH STEELS INCREASE PAYLOADS

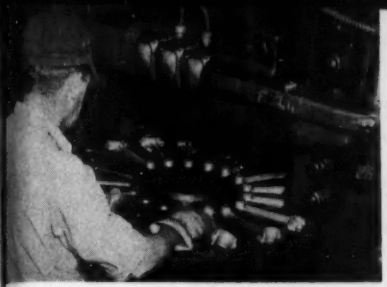
Use of low-alloy, high-strength steels saves 25% in weight of mobile equipment. Boxcar bodies have been lightened as much as 8,000 lb. and 70-ton hopper cars by 10,000 lb. Maintenance is reduced because atmospheric-corrosion resistance is four to six times that of mild steel and two to three times that of copper-bearing steel. These steels have satisfactory workability and many have excellent weldability.

Minimum yield of high-strength steels (in sections ½ in. and under in thickness) is 50,000 psi. compared to 33,000 psi. for ordinary steel. —AMERICAN MACHINIST

GROUTS SEWER JOINTS

Necessity of watertight joints in a Tacoma, Wash., trunk sewer led to the development of a machine to apply grout under pressure to joints. New machine, operating on 35-lb. pressure, mixes dry sand and cement by air jets, the mixture being expelled through a ⅜-in. nozzle. At nozzle, water is added, and the wet mixture is applied from bottom of joint up each side. For 36-in. bell-and-spigot pipe, 1 cu. ft. of grout is needed for each seal, 5 to 8 min. being required per joint. Hand finishing is not necessary.

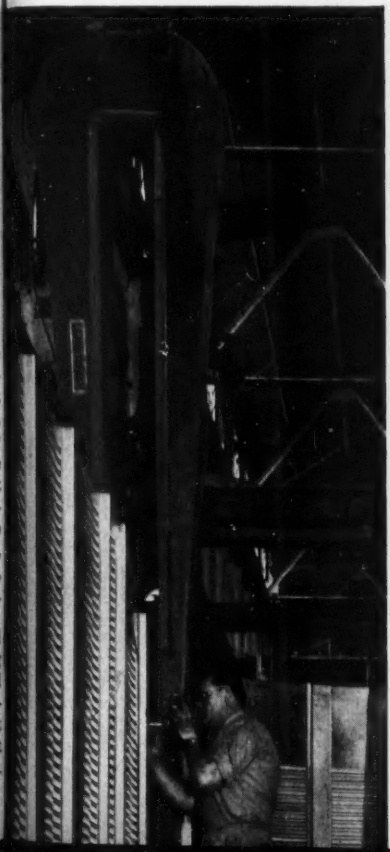
Machine, 3½-cu. ft. capacity, is mounted on rubber-tired wheels, moves along plank framework above pipe. Standard air compressor is used with grouting machine. Under test, machine-placed grout withstood a 10-ft. head of water without leakage. —ENGRG. NEWS-REC.



INCREASES PRODUCTION—Rotating workholder for automatic die work at International Harvester increases safety, accuracy, and output through accurate positioning of work for coining, straightening, and automatic ejection. Work area is outside range of moving parts, reducing the accident hazard. —BUSINESS WEEK

WORK SIMPLIFIER—This circular workplace at Zenith Radio Corp. is one of many devices which ease work, cut costs, and improve speed and quality of production. Workers are encouraged to improve efficiency through simplification of jigs and tools; the plant methods department serves as a clearing house for ideas. —FACTORY

Ways To Speed Production



TIME SAVER—Tall reach of fork lift on rubber-tired tractor permits it to quickly, easily, place prefabricated sections on roof of Precision-Built Homes on Pacific Coast. —CONSTRUCTION METHODS

FAST BODY WELDER—Used at Fruehauf Trailer Co., giant welder (left) straddles sides of the stainless steel trailers, eliminating special clamping, necessary with standard welding equipment. Welder is easily positioned by one man. —BUSINESS WEEK

Artist's conception of the bus of the future. Cockpit increases driver's visibility, passengers' comfort. Rear end will be detachable for service to engine.

BUS OF THE FUTURE

The bus of the future, now on drawing boards of bus designers, will combine streamlining, comfort, efficiency, and economy. Future commuter bus may employ elevated cockpit for driver, to give driver better vision, more room for passengers. Driver will enter cockpit by a drop ladder. Passengers will sit forward to the windshield. One door near center will provide central entrance and exit. For ease in engine maintenance and repair, the lower half of the rear end can be removed as a unit.

Standees in intra-city buses will be able to see out through small windows above the main windows. When door opens, steps will fold down; closed, they will form part of the all-around bumper trim. Buses for airports will have a transparent glass roof, tinted to cut glare. Seats will be push-back, theater-type, three in a row. Long, low body will be streamlined for long-haul city-to-airport highway travel.

"Busports"—stations—will offer passengers general merchandise and drug store facilities, and roomettes for overnight stops. —BUS TRANSPORTATION

PAPER PALLET

Conventional pallets used in building unit loads for handing with electric lift truck can be replaced by a single, inexpensive sheet of corrugated fiber board. This has been made possible by the Pul-Pac attachment developed by Clark Tructractor. Unit loads are stacked on the sheet and then pulled onto a carrying platform by a grab on the bottom of a moving gate, the grab clamping over a protruding edge of the sheet. In unloading, loads are pushed off by the gate. —AMERICAN MACHINIST.

FAST ELECTRONIC LENS

Utilizing a Kerr cell to electronically "open" and "close" the light path to lens, a new camera shutter will now take 25 photos in 50 millionths of a second. Cells employ a liquid—such as a benzol solution—that polarizes with application of proper voltage to cut out light rays. Cell is coupled with a polarizing element that is perpendicular to predetermined axis; the combination blocks all light. It can be actuated by trip wire or microphone vibration. —SCIENCE ILLUSTRATED

SHORT-HAUL AIRFREIGHT PAYS

Short-haul airfreight lines will save shippers money and time on trips of 200 miles or more, with per ton-mile rates between 20-26.5c. Some carriers, using C-47's, quote rates as low as 13-15c. Railroad express, fastest surface transportation, ranges from 9.2c per ton-mile to 22.4c. Truck costs are 5-10c per ton-mile. However, air shipment effects savings through quick delivery of much needed goods; less spoilage and deterioration; more direct carrying; lighter packaging; and less icing. —AIR TRANSPORT

FAST TIMBERING MACHINE—Track-mounted machine permits Weirton Coal Co. to reduce timbering crews 50%, yet increase safety and speed in timbering operations. The machine has a hydraulically operated boom for placing and holding cross beams, a power saw, and a trailing car for supplies. The hydraulic boom, capacity 1,000 lb., has a swivel saddle to hold beams. Boom will work 10 ft. 5 in. beyond rail end, will raise beams 11 1/3 ft. above rails. It operates through 180 deg. In present procedure, boom places a 12-ft. 6x6-in. beam and holds it, leaving a 2-man crew free to clean area and place vertical supports with safety. —COAL AGE

OPINION METER

By electronic casting of secret ballots, the composite opinion of groups as large as 120 is measured with a new General Electric instrument. A hand-held individual station, connected by a flexible cord with the indicating meter, is set to the degree of positive or negative opinion held by the voter, and the meter integrates the total expression of opinion. There is an "off" button on the individual station. —ELECTRONICS

NEW METAL FOR MOTORS

Hiperco, a new metal developed by Westinghouse Electric Corp. — 64% iron, 35% cobalt, 1% chromium — has an exceptionally high capacity for magnetism, yet is strong and ductile. The special metal will permit lighter electric motors, or motors of higher horsepower with the same weight. The metal is poured in ingots, rolled into 2- or 3-in. slabs. Slabs are reheated, rolled to a thickness of 1/10 in., quenched in cold water, cold rolled to 0.002 in. —BUSINESS WEEK

POWER GROUNDS PAY

In one area investigated, nine out of ten grounds on power lines had dangerously high resistance, the average being 220 ohms. Reduction to 20-ohm. average cut to one-third the distribution-transformer interruptions, increased consumer satisfaction. When resistance of 8-ft. ground rod is too high, procedure is: connect to water pipe if available; tie to second 8-ft. rod driven 6 ft. or more away; put extensions on rod and drive deeper; drive a third rod; as last resort, salt the earth around ground.—ELECTRICAL WORLD

TRUCK CARRIES TRUCK—Steel scrap is collected at Edward Valves, Inc., by a unique and economical method. A tilting dump body mounted on an ordinary four-wheel truck picks up the scrap. When full, this truck is picked up by a battery-powered electric fork truck and carried to a truck trailer for dumping. —AMERICAN MACHINIST

Latest in Highway Engineering

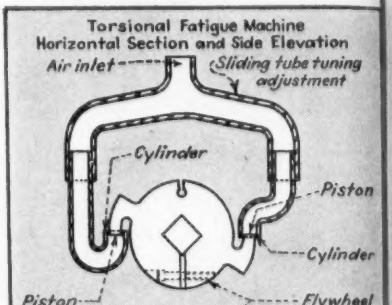
Planning of 486-mile express highway stresses safety and beauty. Thruway t have two 37-ft. traffic lanes, one in each direction, separated by ma

To link New York City with the western border of Pennsylvania, a 486-mile express highway will incorporate the latest in highway construction, safety, and landscaping. Running north from New York City to Albany and then west through the Mohawk Valley, a 30-mile strip on either side of the highway will include 90% of the state's population and 86% of the registered vehicles. The right-of-way will never be less than 250 ft. wide, and will carry two 37-ft. lanes of traffic, one in each direction, separated by a mall.

Concrete surface will be 9 in. thick; gravel subbase, 12-in. Bridges will be sufficiently wide to permit fast traffic without physical or mental hazards. At underpasses, a minimum clearance of 10 ft. will be provided between the face of the underpass and the near edge of the traffic lane. Minimum width of such underpasses will be 114 ft., including a 20-ft. mall.

On bridges and other structures carrying the highway, a 30-in. safety walk will be provided, parallel to the traffic lane. A 6-ft. safety slab will separate the walk and the traffic lane. Over such structures the mall will be reduced to 8 ft.

Although the route lies within the Catskill and Berkshire mountains, no grades will exceed 3%. Safety engineers have specified sight distances of never less than 1,000 ft., curve radii of not less than 2,800 ft. The center mall will be of sufficient width to eliminate the danger of head-on collisions. At points of entrance and exit, long acceleration and deceleration lanes will permit traffic to attain the proper speed before entering or leaving the high-speed road. These lanes, plus elimination of entrances from adjoining property and a minimum of intersections with other roads, wil eliminate need for traffic lights, and min imize the danger of sideswiping acci dents. Cuts and fills will be landscaped as will entire right-of-way. Landscap and safety engineers will supervise th



TUNED FATIGUE TESTER—Tuned air columns vibrate a test piece at its own resonant frequency to simulate dynamic loading conditions in the pneumatic fatigue machine developed by General Electric Co. The tester uses an opposed-cylinder driving mechanism. Small, lightweight pistons are fastened to the test piece, which is then positioned so that the pistons are located between the openings of the opposed cylinders. Air pressure impulses from the cylinders then vibrate the specimen. By changing length of air path until impulse frequency matches natural frequency of specimen, maximum amplitude is produced. For high-temperature testing, an induction furnace is placed around the piece. Torsional fatigue tests are made with the variation of the machine shown above. —PRODUCT ENGR.

planting of the center mall to conform with safety and eliminate the glare of approaching headlights. Outdoor advertising will be limited to commercial sections of road. —ENGRG. NEWS-RECORD

EXTREME HOT, COLD BELTS IN UPPER ATMOSPHERE

Tests with V-2 rockets by National Advisory Committee for Aeronautics refute the old belief that above 35,000 ft. temperatures remain a constant —67°F. From 35,000 to 105,000 ft. the temperature varies from —10° to —120°F., with probable average temperature of —67°F. At 105,000 ft., the temperature begins to rise, and at 165,000 ft. it ranges from 80° to 120°F., remaining fairly constant up to 215,000 ft. In the belt between 215,000 ft. and 260,000 ft., the range is 220° to —160°F. After 280,000 ft., it becomes progressively hotter, the temperature being about 212°F. at 400,000 ft. altitude. —AVIATION NEWS

FOR HOT MOTORS

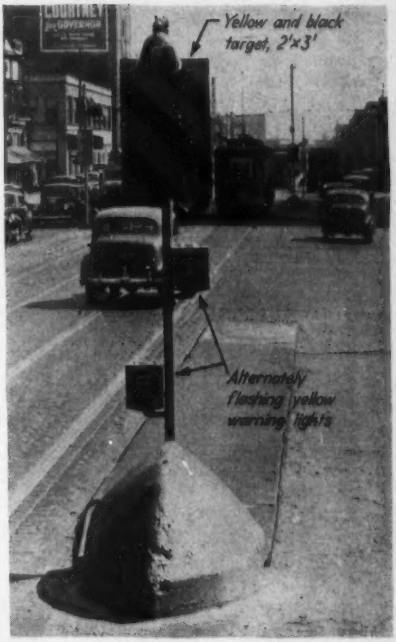
Motor manufacturers and repair shops should give serious consideration to the relatively new silicone varnish when insulating machines for heavy service or operation in hot and humid locations. This heat-stable varnish can be cured at 300° F. in ovens designed for low-heat, organic impregnating. It has high heat stability, low water absorption. To achieve the full purpose of heat stability, however, silicone varnishes should be used in conjunction with inorganic insulating materials (glass, mica, asbestos bonded or impregnated with silicone resins). —ELECTRICAL CONTRACTING

FLOTATION CLEANS COAL

Slate, sulphur, and other impurities are removed from crushed coal by gravity separation at H. C. Frick Coal Co. Essentially the same process used in metal mining operations, it employs magnetite as the flotation agent because is gives better gravity control over a wider range, remains in suspension without agitation, and can be recovered easily by magnetization.

Crushed coal is fed by conveyor into an inverted cone tank; coal is skimmed off the top, impurities taken from the bottom by J-shaped pipe. Coal travels to draining screen, then is washed to remove magnetite, which is magnetized by electric coils, recovered by separation, then demagnetized.

The plant will produce 20,000 tons of coking fuel per day. —BUSINESS WEEK



MODEL SAFETY ISLAND—After a year's experimentation with various designs, this safety island will be installed at 1,500 sites in Chicago. Prow is concrete, designed to withstand any impact it might receive; support of lights and board is hinged to buckle rather than shear on impact. Yellow and black board, 2x3 ft., is continually illuminated. Two diagonally placed, alternately flashing lights are yellow, these being lighted 30 min. before and after street lights are in use. Installations will cost an estimated $900,000. —ENGRG. NEWS-RECORD

NEW PRODUCTS

Magnetic Music—Half-hour continuous programs can be recorded on magnetic paper tape, then played back through reproducer unit in the Sound-Mirror. Tape can be cut and spliced with cellulose tape, may be played 1,000 times. Program can be erased and another recorded on the iron-powder-coated tape. Unit can be plugged into home radio for recording programs; hand microphone will record home-talent. Brush Development Co. makes it. —ELECTRICAL MERCHANDISING

Handy Hardness Tester—Weighing less than 2 lb., a new portable hardness tester has a screw action which applies pressure to force diamond or ball-point penetrator into material. Pressure causes C-frame holding material to spring and move a dial indicator. Barrel graduations denote hardness in Rockwell B & C scales. Ames Precision Machine Works developed it.—AMERICAN MACHINIST

Foil Keeps Candy Fresh—Bulk candies now are packaged in heat-sealed aluminum foil by Chase Candy Co. to retain freshness. Package is moisture-proof, reflects heat, blocks deteriorating light rays. —FOOD INDUSTRIES

BOOSTS PRESSURE—Increasing pump rating as much as three times, the new Hydro-Pump, Inc., pressure booster can be fitted to any hydraulic system. Cylinder block has six parallel bores, each fitted with double-action, reciprocating pistons. Central valve rotates, connecting pistons to fluid source and providing uninterrupted flow. Booster comes in 35- and 100-gpm. sizes, each size available with pressure ratios of 2¼:1 and 3:1. It does not increase hp. of the system; requires power only for rotation of the valve. —BUSINESS WEEK

Prints, Develops in 25 Sec.—Typing, drawings, and printed or photographic materia can be reproduced in a new printing and developing machine in 25 sec. Reproduction can be in several colors—black, blue, re sepia, or yellow—on paper, fabric, film, fo or plastic. No chemical baths are used prints are developed dry and can be use immediately. General Aniline & Film Cor developed the machine. —FACTOR

Good Hp.-weight Ratio—The 9-cyl., Cyclon 9HE, 1,525-hp. plane engine will have a hp to weight ratio of 1:0.93. Use of water in jection or 122-145 octane fuel will increas the power output by 100 hp. over the 9H engine. The new Wright Aeronautical Corp engine will be installed in CW-32 carg planes. —AVIATION NEW

Portable Rock Crusher—With a capacity o 100 to 150 tons per hr., the new Dixie por table rock crusher reduces quarry-run t minus 1-in. or to agstone in a single opera tion. Crusher is fed directly by shovel; wet sticky material will not clog it. Combination from 85% rock to 100% agstone can be pro duced. Mounted on 24 rubber-tired wheels crusher is driven by V-belt, other equipment by separate generators. —ENGRG. NEWS-RECOR

Stacks It 18 Ft. High—Operated by battery powered electric motors, a new Elwell-Parke Electric Co. fork-type industrial truck wi lift a 3,000-lb. load 18 ft. for high stacking in warehouses. —CHEMICAL ENG

For Precision Soldering—Designed for pre cision soldering of light, hard-to-reach parts a new 96-watt, 3-oz. tool of Thermador Elec trical Mfg. Co. develops 6 volts across tw 3/16-in. carbon-tips. The 50-60-cycle, 11 120-volt tool requires no preheating. It come with a transformer. —ELECTRICAL WORL

Super-soft Polisher—Consisting of a specially modified compound of neoprene impregnate with abrasive, a polishing wheel developed by Raybestos-Manhattan, Inc., has "cushion" action and extreme flexibility. It is designed to produce superior finishes on stainless steel glass, nonferrous and precious metals. —POWE

Shapes Metal Shells—Drawn or spun shells are bulged, curled, necked, beaded, wired flanged, or trimmed by new E. W. Bliss Co welded steel lathe. Multiple friction clutch and brake give instant start and stop; offset adjustment of tailstock permits use of inside form rolls instead of sectional chuck in necking operation. —BUSINESS WEE

Adapts Machines to Jig Grinding—Jig borers, lathes, milling machines, and other machine tools are quickly converted to precision jig grinders by the 30,000- to 75,000-rmp. air-driven, grinding attachment announced by Vulcan Tool Co. The 7½-in.-long, 2½-in.-dia. unit has adaptors which fit into chuck or toolpost. Holes from 1/16- to 1½-in. dia. can be ground. —AMERICAN MACHINIST

Alternator Charges Batteries—An alternator, developed by Leece-Neville Co., for service on 6- and 12-volt mobile equipment, gives extra high current output at low speeds. Alternator delivers 25-35 amp. at idle speed, 60 amp. from 12-15 mph. Consisting of an alternator, voltage regulator, and rectifier, the system weighs 40 lb. —BUS TRANSPORTATION

Smothers Lightplane Fires — To smother a lightplane engine fire in seconds, 20-lb. anti-fire unit engineered by Walter Kidde & Co. discharges carbon dioxide gas into every corner of engine compartment. The unit consists of a lightweight cylinder containing 5 lb. of liquid CO_2, a pull-release handle, and piping leading from cylinder to danger spots in engine compartment. —AVIATION

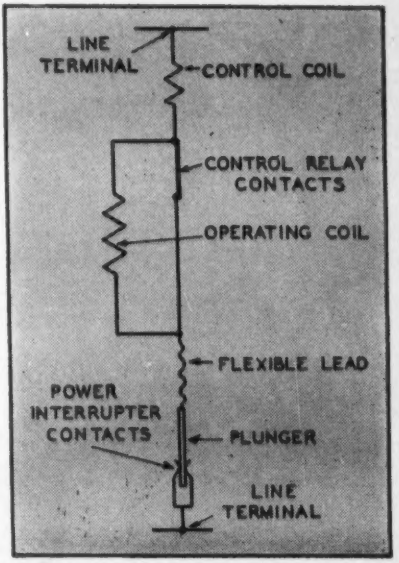
Pneumatic Screw Driver—A new fast-driving pneumatic screw driver of Keller Tool Co. has a suction device which picks up screws for starting. In two sizes, one driver has a free speed up to 2,500 rpm., handles screws up to No. 3; second has a free speed of 10,000 rpm., handles No. 6 screws. —MILL SUPPLIES

Adhesive Insecticide—Developed by B. F. Goodrich Chemical Co., a polyethylene polysulphide product, called Peps, may be used as a carrier for insecticides or fungicides in crop spraying. Not washed off, it has some fungicidal qualities itself. —BUSINESS WEEK

Water Ash Curtain—Developed primarily for foundry cupolas, but suitable for stacks of various kinds, a new device utilizes a water curtain to collect cinders, fly ash, and dust, as well as to quench sparks and flame. Water is pumped through a conical jacket and rushes out of an opening at the apex, then flows over the edge of the outer periphery, forming a curtain through which gases from stack must pass. C. C. Hermann & Associates developed it. —CHEMICAL ENGRG.

Flexible Rectifier — Heavy-power selenium rectifiers developed by Federal Telephone & Radio Corp. can be made to produce various combinations of voltage and current by connecting the plates of each section in different ways. —ELECTRICAL WORLD

Folding Portable Crane—To clear doorways, upper part of vertical post of a new portable crane can be lowered on pivot to horizontal position. It is raised by winding hoisting cable on drum, then locked. Maximum capacity of the Revolvator Co. developed crane is 4,000 lb. —POWER



CIRCUIT RECLOSER—Essentially a reclosing oil circuit breaker, the new Recloser has an inverse time current characteristic similar to that of a protective relay. It also has an automatic reclosing feature similar to that provided by reclosing relays. The unit is reported thereby to provide for fuse coordination. For circuits up to 12.5 kv., the Recloser has 60-250-amp. ratings, 4,000-amp. interrupting capacity. Main operating coil normally is bypassed by contacts of control relay. Latter acts as an initiating relay and operates on overloads or short-circuit currents. Control contacts open in ½ cycle to force overload current through main coil to retract plunger. Releaser resets after short interval.—ELECTRICAL WORLD

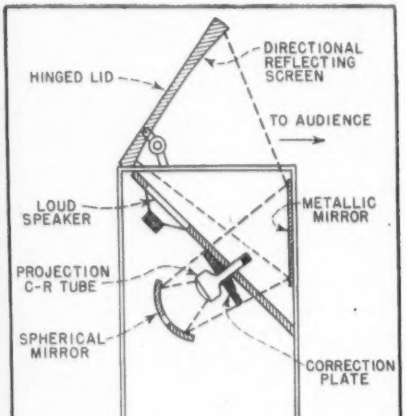
In-floor Conveyor—Roller conveyor to be laid in 6x14⅝-in. trench in factory floor is made in 10-ft. lengths by Engineering Products Co. Curved trackage and turntables are available. One man is able to push loads over the ball-bearing rollers. —BUSINESS WEEK

Weighs 12 Bobbins at Once—Twelve warp bobbins can be weighed at once by the new machine developed by J. A. King to determine whether bobbins contain sufficient yarn to complete cloth without necessitating tieing. Lights, numbered to correspond to bobbins, flash red if insufficient yarn is on bobbin, green if sufficient. Gage saves 30-50% in redrawing time over old measuring by fork, one-third over previous single bobbin weighing. —TEXTILE WORLD

NEW PRODUCTS

Handy Little Oscilloscope — Measuring 4x10x6⅝ in. and weighing but 5¾ lb., the new portable cathode-ray oscillograph of Waterman Products has a self-contained power supply. It can be used for examination of electrical waves, frequency measurements, phase shift, and power-modulation determination, tracing of curves representing various functions, and adjustment of several types of apparatus. —ELECTRICAL WORLD

Quick Addressing—Newspapers, magazines, and direct-mail pieces can be addressed at the rate of 8,000 an hour with the new Dick's mailer. Continuous roll strip of names feeds past knife. Lowering the mailer cuts strip, pastes it to paper. Address roll holds 2,000 names, paste in reservoir. —BUSINESS WEEK



BRIGHT TELEVISION—A 15x20-in. picture of unusual brightness, contrast, and resistance to external light is projected by Philco's new black-and-white television receiver. Secret of receiver, which uses a 4-in. projection tube and Schmidt optical system, is a directional viewing screen. This consists of a coating of unannounced composition on a curved aluminum back. Screen confines reflected light to a small vertical angle but permits spread over perhaps 80 deg. horizontally. Many viewers seated around set receive an equally bright picture, but little light is lost in direction of floor and ceiling. Screen does not reflect external light into eyes of observers, preserving high contrast. —ELECTRONICS

Tiny Airborne Radar Set—Weighing 100 lb., compared with 500 lb. for sets used during the war, a new airborne radar set will have gyroscopically stabilized antenna to compensate for plane banks and turns during operation. It will have a range of 100 mile. The set is under development by General Electric Co. —AVIATION NEWS

For Toolroom—New 12V universal miller of Reed-Prentice Corp. has an adjustable head on a sliding ram. The head can be tilted up to 45 deg. front to back, 30 deg. left to right, and can be depressed for milling with an arbor. Spindle speeds are infinitely variable from 90 to 2,200 rpm., feed rate from ⅛ to 16 ipm. Control is from a single pushbutton panel. —AMERICAN MACHINIST

Receives Television, FM—Through five sets of aluminum-alloy elements, radiating in two directions, all television and FM channels are received by the new "di-fan" antenna, produced by the Andrew Co. Supporting member is plated steel; mounting brackets fit to chimney or roof. —ELECTRICAL WHOLESALING

Low-pressure Resin—Derived from a complex organic glycol, the new GRM-2 resin can be molded at 15 to 40 psi., compared to 100 psi. often used in this type of work. This development of Goodyear Tire & Rubber Co. can be laminated. —CHEMICAL ENGRG.

Saves Fuel Oil—New Bogue Electric Co. combustion control unit for oil-fired furnaces is said to save 15-20% in fuel. As furnace starts, extra air is introduced to give clean, efficient combustion. As furnace warms, device reduces air. —BUSINESS WEEK

Portable Water Softener—New portable water softeners using salt as regenerating agent have hose connections to fit almost any faucet. Small model is 12 in. high, weighs 15 lb.; larger unit is 28 in. high, weighs 27 lb. Water enters softener at the bottom through rubber hose; soft water is expelled through hose at top. —ELECTRICAL MERCHANDISING

Eliminates Static In Cloth—Radioactive rays emitted by a shielded bar ionizes the air so that it serves as a conductor to remove static from cloth. The radioactive bar is completely shielded, rays being directed on the cloth only. Mounted on a cloth swing, it reduced downtime of the swing 20%. U. S. Radium Corp. developed it. —TEXTILE WORLD

Vaporizes Germicide—Vapors of ozone and pinene are electrically vaporized in the Perfection Stove Co. Perfect-O-Mister. Tests have proved vapor's safety and germicidal qualities. —BUSINESS WEEK

Handy Auger Bit Set—Auger bit sets, including a single shank and six bits varying in size from ⅝-1¼ in., are being manufactured by Bruno Tools. Shanks are 8½ or 11 in. long. —MILL SUPPLIES

PORTABLE CEMENT MIXER—This 3-cu. ft. mixer, capable of handling asphalt mixes, sand, feeds, foods, ceramics, chemicals, and concrete, has a revolving drum and three stationary blades. A 12-hp. gasoline engine drives unit; water pump is timer controlled. Mixer turns out two batches of mix per min., weighs 1,500 lb. It has a towing attachment. Foote Co., Inc., developed the mixer. —BUSINESS WEEK

Rub-on Aluminum Solder—Said to open a new range of soldering applications for aluminum work, a low-temperature rub-on solder has been developed by All-State Welding Alloys Co. An alloy which is applied without flux, it is to be used in production assembly of aluminum shapes and wire and for repairing casting blowholes. —ELECTRICAL WORLD

Resin from Petroleum—Suitable as a protective coating for iron, brass, bronze, aluminum, and highly polished metals, as well as wood and steel, the new A-Resin of Esso Laboratories is derived from crude petroleum. It is said to have good adhesion, flexibility, and wetting power, making it useful on surfaces difficult to paint with ordinary coating materials. —CHEMICAL ENGRG.

Motorized Hand Truck—Designed to do the work of a fork lift or high-lift platform truck where the larger units are impracticable, the new Transtacker is a battery-powered hand truck. Steered and controlled by lever at front, it carries load to spot and elevates it for stacking. Automatic Transportation Co. built it for loads to 4,000 lb. —FOOD INDUSTRIES

Midget House Heater — Pressures replace drafts in the firing zone of the new Miller Co. automatic oil burning heater, giving higher heat transmission. Oil consumption is 30-50% below that of standard oil burners, being a maximum of 0.8 gph. Heater will fit into cabinet. —ELECTRICAL MERCHANDISING

Measures Peak Uhf Voltage—Peak ultra-high frequency, 0.1 to 1 voltages, are measured directly to ±5% accuracy up to 1,000 mc. by General Radio Co.'s new type 1802-A crystal galvanometer. Two multipliers extend the range to 10 or 100 volts. For measuring voltage ratios, frequency limit is well above 1,000 mc. Instrument employs a crystal rectifier, dc. amplifier, meter, batteries. —ELECTRONICS

New Vinyl Ethers—Considered almost laboratory curiosities, a new series of vinyl ethers will be produced by Carbide & Carbon Chemicals Corp. Vinyl ether will be available in commercial quantities; vinyl isopropyl ether, in pilot-plant quantities; vinyl ethylhexyl ether, in experimental quantities. Extremely reactive, these new ethers offer interesting possibilities in synthesis and polymerization. —CHEMICAL ENGRG.

10,000-hr. Lamp—Having a heavy hot cathode with a large amount of emission coating, a new 8-ft. slim fluorescent lamp starts instantly, operates efficiently, burns 10,000 hr. The 35-watt, 120-milliamp. light is made by Duro Test Corp. —ELECTRICAL WORLD

Welder Boosts Current—When the electrode touches the work, a booster increases the current supplied by Lincoln Electric Co.'s new Fleet-Arc ac. welder without using high-frequency devices. Booster current is adjustable. —AMERICAN MACHINIST

All-purpose Lubricant—Practically all needs of cutting and loading machines in coal and metal mines are said to be met by the new all-purpose Lubricant B developed by Gulf Oil Corp. The tenacious lubricant lasts well, leaks less, lubricates in wet conditions. —ENGRG. & MINING JOURNAL

Plastic Coating for Wood—Forming a resin coating impervious to heat, moisture, chemicals, and insects, Phenoglaze—a phenol-formaldehyde coating—is air drying and cold setting. Coating also can be applied to metals. —BUSINESS WEEK

Protects Appliances—Plugged in at either end of an electric appliance power cord, a new signal lamp glows dimly to show normal flow of current, brightly when current reaches appliance's watt rating. Pilotron Co. of America makes it. —ELECTRICAL CONTRACTING

FREE SERVICE TO READERS

As a special service to our readers, McGraw-Hill Digest will furnish, without any charge, additional information about any new product or technical development described in this publication. Inquiries are welcomed. Address your letter to: The Editor, the McGraw-Hill Digest, 330 West 42nd St., New York 18, N. Y. U. S. A. —*THE EDITORS*

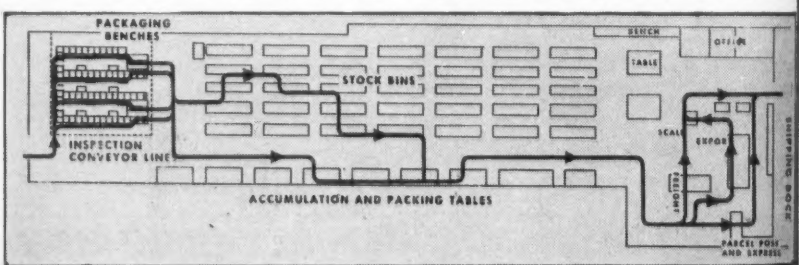
Latin America Industrializes

Countries have had accelerated production in last few years. Long-range programs call for further increase to supply more of local requirements

Brazil—First place among Latin American nations with respect to the number of manufacturing companies, value of goods produced, and number of industrial workers is held by Brazil. Having keyed its industries to the natural riches of agriculture, livestock, and mineral wealth, the country is elaborating an expanding industrial structure that seeks to achieve a high degree of national self-sufficiency. It is in the midst of an unprecedented economic transition and industrial diversification, but Brazilian industry still is in its infancy. Although there are more than 82,000 industrial establishments, production of consumer goods does not meet requirements. The principal industrial development in Brazil during World War II was the initiation and growth of a metal industry. There has been a construction boom, too.

Argentina—Industrial expansion in Argentina has increased the number of employees by 600,000 in the past 10 yr. Recently established factories have been technically stimulated by immigration of technicians and engineers from Europe, who brought with them capital and manufacturing experience in specific industrial fields. At present, Argentina is packing her own foodstuffs, is manufacturing a number of basic chemicals, and she makes her own cement, soap, glass, clothing, shoes, woolen, silks, and rayons. In 1944, Argentina's industrial establishments were processing 80% of the agricultural production. Export of raw materials declined from $440,000,000 in 193 to $170,000.000 in 1944. Over the same period, the value of semi-finished and finished manufacturers increased from $136,000,000 to $375,000,000. Metalworking plants are increasing in number and expanding in size. (A far-reaching 5-year program of future industrial expansion has been planned by Argentina. See p.35.

Mexico—Coordinated long-term $383,000,000 programs of basic industrialization have been outlined for Mexico. Among 58 projects for which plans were approved are expansion of the iron and steel industry, modernization and expansion of the textile industry, a 10-year $50,000,000 program for the development



MAN-HOUR OUTPUT UP 250%—By integrating inspection, packaging, finished stock, and shipping departments around a continuous roller conveyor system, Packer Appliance Co. has raised its per man-hour production 250% without increasing floor space. Inspectors work on both sides of four conveyors running through the department. Materials passed by inspection move down conveyor in totepans to packers working at conveyor-level benches to avoid lifting. Material for stock is placed in packages on conveyor beneath bench; that for shipping arrives at packaging department complete with shipping papers. Large shipping orders are placed on special trucks with movable slats so banding can be accomplished without lifting. —FACTORY

of power facilities, a $158,000,000 irrigation program that will open large areas for agricultural development, rehabilitation of the railroad system, expansion of the concrete manufacturing industry, and establishment of a chemical industry. Food-packing industries also may be expected to develop in Mexico.

Other Countries—Industrial programs in the smaller Latin-American countries envisage the development of power plants, food-packing establishments, cement mills, and building-supply companies. These programs also embody improvement of communications, diversification of crops, development of transportation facilities, rolling stock, textile mills, and marine and export-trade projects. Erection of hydroelectric and steam power plants will provide these countries with a source of power as they develop.

The industrializing process in Latin-America will, however, depend upon removal of many obstacles to expansion of a manufacturing system, and will involve a great many decades.—From "Industrialization of Latin America", McGraw-Hill Book Co.

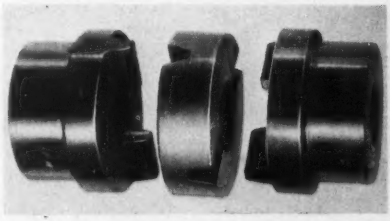
Argentine Five-Year Plan

$1,600,000,000 to be spent during 1946-51 to reduce dependency upon foreign capital and imports, to increase self-sufficiency. Immigration planned

During the period 1946-51, Argentina will spend $1,600,000,000 in reorganization and development of her national economy. The program is designed to free the country from foreign capital, lessen the country's dependency upon imports of raw materials, and to increase the self-sufficiency of its industry. By lessening the amount spent for imports of raw materials, Argentina will be able to divert the foreign dollars saved to importation of greatly needed heavy equipment and machinery. Plan encompasses land reforms, immigration of 250,000 foreign nationals, improvement in labor conditions, development of natural resources—to include hydroelectric power, petroleum, forests, and fisheries—and the expansion of the nation's industries.

A 1,200-mile gas pipeline will connect the oilfields of the Commodora Rivadavia area with Buenos Aires, bringing natural gas to 40 new communities, 400,000 new consumers. The national electrification plan is to be extended over a 15-year period. Lacking hard fuels, hydro-electric plants will supply the country with 1,400,000 kw. of power, an increase from 45,000 kw. A network of 2,800 miles of power transmission lines is planned. Power production and land irrigation programs will be closely knit.

Steel output will be increased from 120,000 tons, 1943 production, to 315,000 tons of ingot in 1951. The increase will eliminate between 20 and 35% of the country's annual imports. Tinplate production will increase from nearly zero to 70,000 tons, replacing almost all of the prewar imports. Production of nonferrous metals will entirely supplant im-



SIMPLE FLEXIBLE COUPLING—Simultaneous automatic correction for angular and parallel misalignment of power shafts is provided by the "gear-tooth" flexible coupling introduced by Industrial Machine Works, Inc. It consists of two identical end pieces with involute gear teeth which mate with a center-piece containing rack grooves cut transversely. —AMERICAN MACHINIST

ports, possibly providing an exportable surplus.

Cotton textile production will increase 17,000 tons, about half of the annual prewar importation. Woolen output will be upped from 21,500 tons annually to 30,000 tons; rayon capacity will nearly double to 8,000 tons; silk spinning will jump from 2,000 lb. per year to nearly 600,000 lb. In 1937, silk imports reached 342,000 lb.

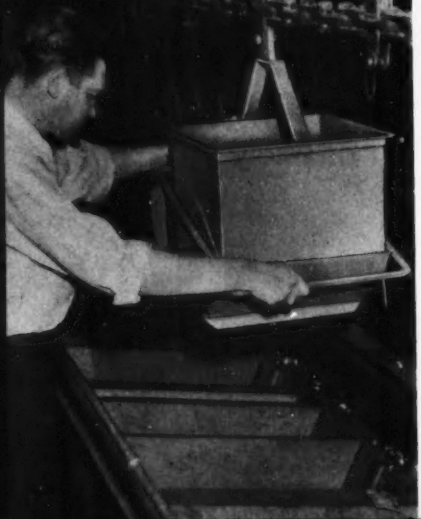
Sodium carbonate production will be 25,000 tons annually, almost equal to previous imports totaling 32,000 per annum. Caustic soda output will be four times the prewar figure of 10,000 tons. Before the war, between 150,000 and 185,000 tons of newsprint was imported annually. By 1951, newsprint production will reach 50,000 tons, other types of paper 190,000 tons.

Specifically, spending will be in the following categories in millions of dollars:

Public health	$155
Immigration	40
Fuel and power:	
Oilfields	124
Gas	54.2
Solid fuels	32.6
Vegetable fuels	11.2
Water power	128
Electricity	97
Public works:	
Navigation and ports	120
Sanitation	120
Roads	111
Transport	180
National parks & tourism	13
Buenos Aires airport	24

Over 25% of the money allocated will be spent to improve transportation and port facilities. The bulk of the money will go into new rolling stock or into refurbishing old stock. A few short lines will be constructed in the western mining region; lines near the Brazilian border will be converted to meter-gage. The Parana and Rio Negro rivers will be dredged to increase port facilities. Ports at Buenos Aires and Rosario will be enlarged; six new ports will be constructed along the southern coast. Argentina's merchant fleet will be increased—88 tugs and vessels of 77,000 tons, and 106 barges and lighters of 60,000 tons are to be constructed. —BUSINESS WEEK

CARRIES BOLTS—Mass production of washing machines and ironers at Nineteen Hundred Corp. requires thousands of screws, bolts, nuts, lockwashers, and other hardware items daily. These are delivered to gravity-feed bins on assembly line in 15-in. square by 16-in. deep dump-bottom hoppers carried on a power-driven overhead monorail chain conveyor. Man on catwalk along tops of bins stops conveyor over proper bin by means of control rod connected to motor switch.—AMERICAN MACHINIST



DIESEL-ELECTRIC CONTROL

Designed for diesel-electric power-plant load control, a new electro-hydraulic governing system developed by General Electric Co. maintains speed at preset value by applying voltage of engine-driven ac. tachometer generator to a hydraulic servo-mechanism which controls engine fuel and generator excitation. Feedback from the electrical load anticipates speed changes and minimizes transient regulation. Remote control is possible. Safety controls are built in.—ELECTRICAL WORLD

DIAMOND DRILLS RAISE MINE OUTPUT

Adopted because of a labor shortage, diamond-drill blast-hole stoping at Book Mine resulted in a production rate of 43 tons per man, counting driller, helper, and scraper operator. Average stoping cost is $4.75 a ton, or $1.83 per foot drilled. Kennametal bits in tests have drilled as much as 153 ft. per $12.50 bit, yielding a bit cost of 8¢ a ton, half that of diamond bits.

Flexibility of diamond-drill blasting makes it possible to recover otherwise unminable ore.—ENGRG. & MINING JOURNAL

PROTEIN FROM MOLASSES

Cheap protein concentrate in the form of yeast is being made from molasses in a Jamaica factory with 12 to 15-ton-a-day capacity. Produced by a fermentation process using an efficient strain of *Torulopsis utilis*, the food yeast is a finely ground, pale cream powder with a "meaty" flavor. Intended as an additive to prepared foods, it is valuable for its vitamin B complex content and is a diet supplement for communities low in purchasing power and short on normal sources of protein. Any suitable carbohydrate material, such as a waste product of the local staple crop, may be used for the fermentation. —FOOD INDUSTRIES

WAREHOUSE ECONOMY

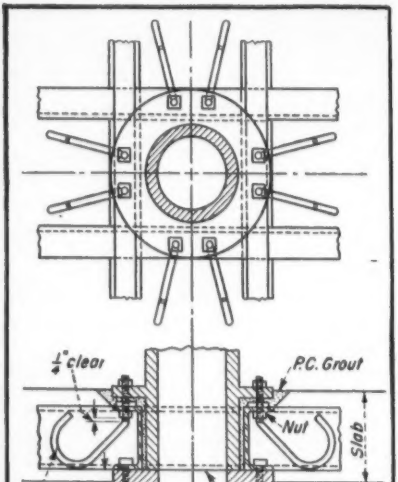
By more economical use of warehouse floor space and shelving, Reliance Electric & Engineering Co. will save $150,000 per year on warehouse costs. A new warehouse, more centrally located, will have 19,400 sq. ft. of floor space devoted to shelving, giving a total of 50,000 sq. ft.; aisles will be 15 ft. wide to facilitate movement of trucks. The new setup will require 31 warehousemen, handling 25% more than the former 80 man crew, saving 100,000 man-hr. per year. Thus 49 men could be transferred to the plant.

Mechanical handling equipment will be used extensively. Roller conveyors will carry incoming stock at inspection; power-operated lift trucks will handle material on the floor. Oversized aisles will accommodate surplus stores when necessary. —FACTORY

NEW ABRASIVE PROCESS

In a new process, a one-step electric furnace operation produces dense, 99% pure, unbroken crystals of alumina. This better abrasive material is made by melting bauxite and additive materials, then cooling slowly. Crystals grow in an unstable sulphide matrix which holds the impurities and which is broken up and decomposed. —AMERICAN MACHINIST

NEW BRIDGE TECHNIQUE—Ingenious precast concrete forms were placed between steel floor beams and sealed with grout to make a comparatively safe, simple job out of paving the center roadway of the high George Washington Bridge. Made of lightweight slag concrete, 1½ in. thick and in shape of inverted pan with 1½-in., 45-deg. sides, the forms were placed from bridge deck level. Since they remain in place as part of deck, stripping is eliminated. When forms were in place, reinforcing rods were placed on top of steel beams and the roadway poured. —CONSTRUCTION METHODS



SUPPORTS FLAT-SLAB FLOORS — Corrosion-resistant, circular, cast iron columns support grillages imbedded in flat-slab, bar-reinforced, concrete floors of a new hog-cooler building at Wilson & Co. Made of short channel pieces, the grillages are connected to special flanges cast on end of column. Spaced 18½x20 ft. on centers, columns vary from 15-in. dia. in basement to 8-in. dia. at fifth floor. The 9¼-in. floor slabs carry 200-lb. live and applied loads per sq. ft.; 8-in. floors carry 125-lb. After floor slab has been poured and next column placed, the space between channels and column barrel is grouted. Cast-iron columns need no protection against corrosion and occupy little floor space. Absence of supports under slab floors makes installation of overhead pipes and ducts simple. —ENGRG. NEWS-RECORD

CONDENSER TACHOMETER

By using the rotating spindle of a tachometer to oscillate a switch which repeatedly reverses the polarity of a condenser in a circuit containing a flashlight battery and a milliammeter, spindle rpm. is registered on the meter as average current from the series of condenser discharges. Utilizing this principle, the electric hand tachometer of Metron Instrument Co., has several advantages: overspeeding does not damage circuit; reading is unaffected by spindle vibration; direction of rotation does not matter; certain difficulties encountered with generator-voltmeter tachometer are avoided. Speed range is 100 to 10,000 rpm.; accuracy, within 1% of full-scale reading. —PRODUCT ENGRG.

BROACHES GOLF IRONS

Produced these many years by grinding from forgings, golfing irons now are made by broaching at McGregor Golf, Inc. Irons are matched within ⅛ oz., and precision of club head shape no longer rests entirely with operator. Three broaching operations are required, and 84 irons an hour are turned out on a 10-ton, 66-in. stroke, vertical duplex broach, with double stations located at one ram. —AMERICAN MACHINIST

REDUCES FREIGHT DAMAGE

Members extending across freight car are held by adjustable wall members firmly against freight to prevent vertical vibration and longitudinal shock to freight while in transit. Used by Maytag Co., this technique permits faster loading, eliminates the use of dunnage, nails, screws, bolts, or band iron. Cost of shipment to dealer is greatly reduced. System was developed by Evans Products Co. —ELECTRICAL MERCHANDISING

SCRAP CONVEYORS PAY OFF

Replacing hand hauling of scrap punchings with an inclined belt conveyor at Shakeproof, Inc., has reduced 104 man-hours of work to 15 min., with an annual saving in labor costs of $6,970. Scrap moves up conveyor to three 25-ton storage bins adjacent to railroad siding. Punched steel coils, up to 150 lb., are carried to bins by a chain conveyor with lugs spaced 4 ft. apart. Chain conveyor is placed beneath conveyor belt for space economy. Shapeproof's profits from scrap reach $60,000 a year. —FACTORY

What's New In Aircraft

Armstrong Whitworth studying jet flying wings; Northrop jet wing expected to fly this summer. Fiat trimotor marks Italy's first post-war plane

Armstrong Whitworth 350-400 mph. twin-jet flying wing of 90-ft. span is the second phase of a long range research program. Ultimate aim is a high speed jet mail or cargo (and perhaps passenger) craft. Next will come a six-jet wing of 230-ft. span, and fourth stage may be a passenger carrying unit.

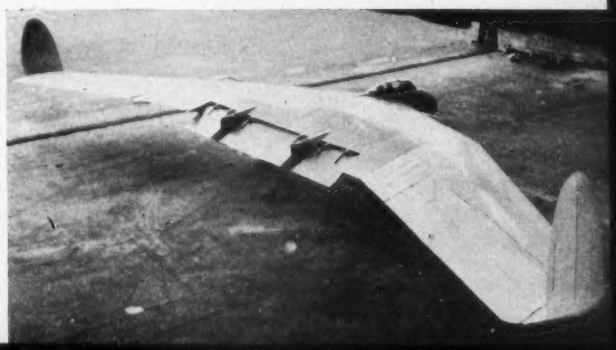
Longitudinal and lateral control of the flying wing are achieved by one surface control in each wing, functioning as both elevator and aileron. A slotted flap of 27% chord at aft end of center section increases maximum lift. Fins and rudders are attached to wing tips. Outer-wings are swept back 35 deg. at leading edge. To correct pronounced outflow toward tips at low speeds, a boundary-layer suction control is set in outer wing surface at about 0.5 chord, suction being controlled by power-operated flaps in the engine intakes.

Laminar flow section of ideal low-drag wing is held to close tolerances by novel manufacturing technique. Wing ribs are in halves, so upper and lower wing surfaces can be made separately. Skin and underlying corrugated strips are held in jigs with a former to assure accurate fit.

Marking comeback of Italian aircraft industry is a large new airliner, the Fiat G-212, an all-metal, low-wing trimotor monoplane powered by 860- or 1,064-hp. radial engines turning 3-blade, full-feathering propellers. Various seating arrangements will accommodate 20 to 40 in the 22,800-lb. 1,552-mi. craft. —AVIATION

One 110-hp. Continental, blower-cooled engine will drive tandem rotors—one above cockpit, one at tail position—in the new Rotor Craft Corp. XR-11 helicopter. Cooling air and exhaust is ejected through the tail. With a gross weight of 1,250 lb., useful weight of 437 lb. is included. Laminated rotors have an 18-ft. dia.; stick, pedals, and pitch controls are conventional; cruising speed will permit 18-20 miles per gal. of gas. With dual controls, plane will sell for about $5,000. . . . Saunders-Roe Ltd., England, is constructing a two-deck, 120-ton flying boat SR45, for long range service. Six prop-turbine engines, 5,000-hp. each, drive contrarotating propellers. Range is estimated at 5,000 mi. at 300 mph. . . . Miles Aircraft, Britain, will build an enlarged, all-metal version of the *Aerovan*. It will cruise 155 mph. for 850 mi. with 5,000 lb. load.

Northrop Aviation Corp. is modifying two of its "flying wings" to jet power. Eight General Electric-Allison J-36 jet engines will drive the YB-49's, expected to fly this summer. Four vertical fins, on the outside of the two banks of 4 jets, were added due to removal of the

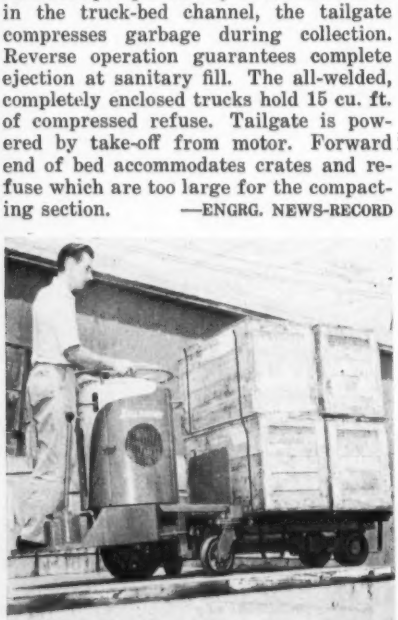


Twin jet British flying wing, forerunner of large, high-speed cargo and possibly passenger craft.

propellers. . . . Indicated airspeed of 143 mph. with a 65-hp. motor was reached during a test flight of the new Rohr Aircraft Co.'s 2-place personal plane. Fuselage has a fat, round forward section, tapering into an "oil can" shaped boom. Tail assembly is butterfly-type; wings are long, chord narrow lightly loaded. —AVIATION NEWS

TRUCK COMPRESSES GARBAGE

At a cost of $900, a garbage truck which compresses and ejects refuse was fabricated in the Dallas, Texas, city maintenance shop. Operated by an endless chain in the truck-bed channel, the tailgate compresses garbage during collection. Reverse operation guarantees complete ejection at sanitary fill. The all-welded, completely enclosed trucks hold 15 cu. ft. of compressed refuse. Tailgate is powered by take-off from motor. Forward end of bed accommodates crates and refuse which are too large for the compacting section. —ENGRG. NEWS-RECORD



TURNS IN ITS TRACKS—With the power unit and driving wheel mounted in a turret which can be turned completely around by the steering wheel, the new industrial lift truck of Salsbury Motors, Inc., has the mobility of a rolling ball. No reverse is needed and there is no gear shift. The 6-hp. gasoline engine is geared to the drive wheel through an automatic clutch and transmission for simplicity of operation. —FOOD INDUSTRIES

ROBOT FLIES PLANE FROM TAKEOFF TO LANDING

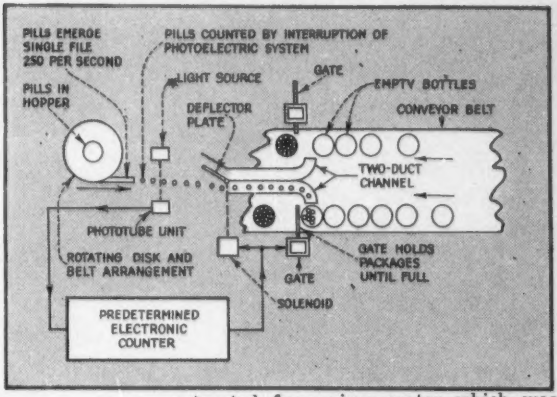
Flights up to 1,100 miles are now possible with only one manual operation—pushing a button before flight begins. The AAF All-Weather Airline has completed 125 of 127 scheduled pushbutton flights in all types of weather with C-54's. Key equipment in the system is a radio altimeter and a Sperry A-12 automatic pilot.

Before takeoff, all flight data is preset on control board, including cruising altitude, course heading, mileage to destination, cruising speed, climb and descent rate. Plane is taxied to end of runway, brakes applied. Then:

1. Button is pushed.
2. Flaps are automatically lowered, brakes released, throttle advanced.
3. At 50 ft., radio altimeter starts master selector control, which gives climb power and retracts landing gear.
4. Flaps come up at 1,000 ft.
5. Climb power and runway heading are maintained till cruising altitude is attained.
6. Throttles are opened and navigational phase starts, controlled by two mileage counters and magnetic heading selectors until preset mileage has been covered.
7. As last mile is covered, radio compass takes over, homes plane on destination radio station.
8. After passing over radio station, throttles are retarded, plane descends in wide orbit about station.
9. At 2,000 ft., wheels and flaps come down and control is switched to ILS 10 to 15 miles from runway. Plane brackets localizer and approaches field in level flight.
10. Glide transmission received, plane starts approach glide.
11. Microswitch in nose wheel cuts power to idle and applies brakes—landings are always three-point.
12. Pilot then takes over and taxis to parking line.

In a plane equipped with this robot, a pilot can, if he desires, get takeoff, climb, cruise, or approach power by button control. The system will advance and lock throttles, and control propeller pitch and fuel mixture. Landing phase is geared to vhf. ILS but has been adapted to Sperry microwave system, eventually to GCA. —AVIATION NEWS

ELECTRONIC PILL BOTTLER—Pills feed from hopper to rotating disk and belt arrangement and emerge in single file at 250 per sec. As they pass through light beam they actuate phototube unit which operates predetermined counter. After preselected quantity, say 100, has passed through light beam, counter operates a relay which actuates a solenoid that moves a deflector plate and thereby channels pills into other duct. Conveyor moves empty bottles in two lines to gates under ducts, these being actuated alternately by same impulses which control deflector plate. When each bottle is filled, gate opens and bottle moves along conveyor belt to the capper. —ELECTRONICS



KNITS MANY PATTERNS IN SEAMLESS HOSIERY

Deriving its name from its patented stitch, American Textile Machine Corp.'s "Holdstitch" seamless-hosiery knitting machine is fitted with 12-step pattern control, 48-move pattern drum, and a 24-move striper drum. Any combination of yarns, colors, wales, and needle action gives almost limitless range of patterns. Yarn is fed to selected needle for a desired number of courses, is held on needle while normal knitting takes place with remaining needles, then all needles resume knitting. Wales are thus shortened and pulled out of alignment, producing tucks, mock wraps, and other effects.

Cylinder sizes of 3, 3¼, 3½ and 3¾ in. available. Knitting machine operating speed is 200 rpm. —TEXTILE WORLD

HEAT PUMP SAVES COAL

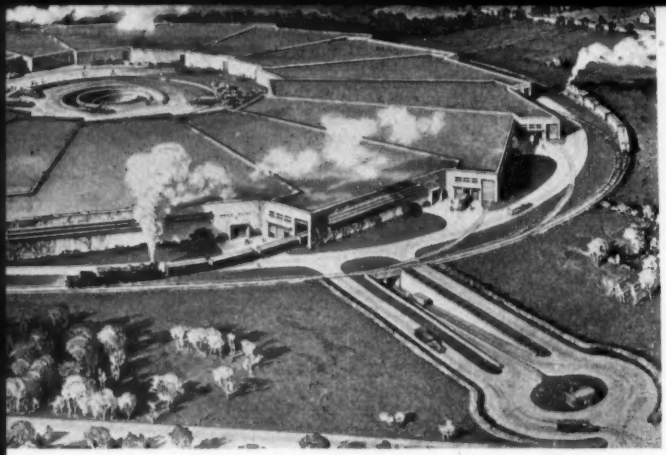
By heating a Norwich power-station building with a heat pump (refrigerator in reverse) made of scrap parts, English engineers saved 40% of the coal formerly used for that purpose. In a normal winter season, 192 tons of high-grade coal was used to heat the building. But it took only 105 tons of low-grade coal to generate the 189,000 kwh. of electricity to operate the heat pump. Heat was extracted from river water which was passed through the pump's condenser tubes.

The Norwich city electrical engineer sees a future for the heat pump, but the ideal application is simultaneous cooling and heating, as in a building containing an ice skating rink and a swimming pool. —POWER

SIMPLE ACCIDENT REPORTS

After studying accident reports from 30 major transit companies, Oklahoma Railway Co. simplified its accident forms and now gets clear, concise reports on accidents involving its vehicles. Each bus is equipped with an accident memo envelope containing all necessary forms and papers. It contains a driver's preliminary report, passenger report, and release form.

"Passenger" card has replaced the "witness" card, to avoid mental fears on the part of the witness. Reverse side of the card shows a diagram of the bus so passenger can indicate his position. Wherever possible on forms explanatory writing has been eliminated, correct answers are marked with "X." To make accident diagrams legible and accurate driver is given a set of rubber stamps to enable him to keep proper perspective in his picture. —BUS TRANSPORTATION



REDUCES FLOOR MOVEMENT — Circular warehouse, planned for a Midwest mail-order house, with 1,000,000 sq. ft. of floor space, will reduce floor movement 75%. Freight trains may enter any of the 16 segment faces from a circular track around the building. Trucks will load at segment faces or at inside loading platforms, accessible through tunnels, lower right. H. K. Ferguson Co. designed the new building. —BUSINESS WEEK

RHENIUM RECOVERY PROCESS

The rare rhenium, related to manganese, is being recovered from flue dust from the reduction of molybdenum. Process was developed by researchers at the University of Tennessee. Rhenium is useful as a catalytic agent or as an electrical filament, and is resistant to HCl. Technicians believe the cheaper metal — made for $200 per lb. instead of $800 per lb. previously — may find use in heating elements for incandescent lamps and radio and power tubes; in pen points, and in anti-knock fuels. —BUSINESS WEEK

EFFICIENT LIQUID STORAGE

Two men handle millions of gallons of incoming chemicals at Hoffmann-La Roche, Inc., through underground pipeline distribution from a central storage area to eight manufacturing buildings as much as 800 ft. away. Waste has been eliminated and inventory report can be given in a few hours. Railroad siding parallels "tank farm." After sampling contents, solvents for underground storage are gravity drained from cars through 3-in. pipe. Chemicals stored in above-ground tanks are blown out by air receivers under 30-lb. pressure or pumped out by 300-gpm. bronze pumps. Tankcars are unloaded from top.

From storage to production buildings, pipes are run through a concrete tunnel, forming a rectangle about the area. Tunnel also carries all other service lines. —FACTORY

SAVES PAPERWORK

Reduction of paperwork to only two forms, work and shipping orders, has simplified and speeded work at Towers Hardware Co. Mail orders and city phone orders are all handled at a city desk, where work orders are filled out, then moved to shipping department. Orders are collected; items not in stock are marked. Orders are then transferred to shipping orders in triplicate. Unfilled orders are filed in a back-order file by manufacturer's name. Filled orders are shipped out with pink and yellow copies of the shipping order, the pink order serving as a receipt.

After delivery is made, pink shipping order is filed with the white original by the matching department for future billing. —MILL SUPPLIES

All Rights Reserved

Items appearing in the McGraw-Hill Digest may not be reproduced, in full or in part, without written permission of the publishers. Contents copyrighted, 1947, by the McGraw-Hill Publishing Co., Inc.

Timely McGraw-Hill Books

MACHINE-SHOP ESTIMATING

By W. A. NORDHOFF, Douglas Aircraft Company, Inc. 486 pages, $6.00.

Here is a text that provides a scientific basis for evaluating the performance of machine shop operators by showing how to estimate the time it should require to perform a job. The book lists all of the elements of operations performed in an average machine shop and establishes reasonable time values for their execution by the average operator. All machine operations are fully described and various methods of estimating the time required to fabricate machined parts are explained.

SERVOMECHANISM FUNDAMENTALS

By HENRI LAUER, ROBERT LESICK and LESLIE E. MATSON, Engineering Department, Victor Division, Radio Corporation of America. 277 pages, $3.50.

The purpose of this book is to introduce the engineering student and the practicing engineer to the principles underlying the theory of servomechanisms. It offers a complete derivation of the basic properties of servocontrol devices and systems, and their direct relation to the simple physical principles that govern their operation.

INDUSTRIAL ELECTRONIC CIRCUITS

By WALTHER RICHTER, Electrical Engineer, Allis-Chalmers Manufacturing Company. 569 pages, $4.50.

Here is a text that steers a middle course between the popular treatment and the exhaustive treatise on the subject. The primary purpose of the book is to show the fundamental principles applying to circuits containing vacuum tubes, reducing such circuits to a combination of more familiar circuit elements so that the average electrical engineer and practical man can analyze the performance of the circuits, and can design them himself. Mathematical requirements have been held to a minimum.

PERSONNEL MANUAL FOR EXECUTIVES

By ROSS YOUNG, *McGraw-Hill Industrial Organization and Management Series.* 207 page, $2.50.

A new approach to books on supervision. This manual is directed to everyone from those in first-line supervision to those in top management. Emphasizing human relationships, it illuminates all the possibilities of psychologized instruction and provides an enlightening and practical treatment of the daily problems of supervision. Much material has been condensed into a valuable, basic supervisory manual for both men and women.

ESSENTIAL BUSINESS MATHEMATICS

By LLEWELLYN R. SNYDER, San Francisco Junior College and School of Accounting, Golden Gate College, 434 pages, $2.75.

This is a collegiate text in arithmetic presenting the fundamentals of business mathematics including intensive refresher work in computation and an introduction in the primary principles and business practice in the arithmetical essentials of concurrent or subsequent work in accounting, investments, business finance, money and banking, insurance, retailing, real estate, statistics, and related business subjects. No knowledge of algebra is required.

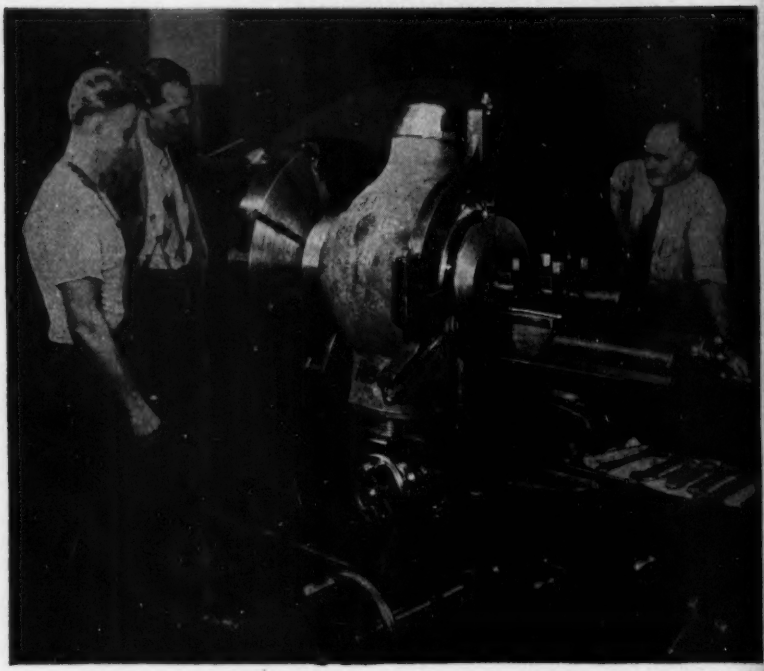
COLLEGE TECHNICAL PHYSICS

By ROBERT L. WEBER, MARSH W. WHITE and KENNETH V. MANNING, The Pennsylvania State College. 761 pages, $4.50.

Presents the basic ideas of physics for students of science and engineering at the college level. Topics regarded as essential for a first-year course are carefully developed in logical order, to give the student an exact knowledge of fundamental physical principles and to enable him to apply these principles with confidence and facility in the solution of technical problems by the scientific method.

McGRAW-HILL BOOK COMPANY, INC.

330 WEST 42nd STREET ● NEW YORK 18, N. Y., U. S. A.



The Lathe that won't say "NO!"

With a swing over the gap up to 61½", it's a pretty rare piece of turning work this big 32"/60" LeBlond Sliding Bed Gap Lathe won't accommodate. Big work, or work with unusual projections, clears this bed handily. It chucks easy. In addition, this lathe will turn all the regular jobs you get . . . with speed and precision.

A LeBlond Sliding Bed Gap Lathe—18"/38", 25"/50", 32"/60"—is a complete turning department in itself, in the space of just one lathe, and with just one investment. One of these lathes should be on the job in your shop. The R. K. LeBlond Machine Tool Co., Cincinnati 8, Ohio. Branch offices: New York, Chicago.

Write for your copy
OF ILLUSTRATED BULLETIN, LeBLOND SLIDING BED GAP LATHES. USE COUPON BELOW

DEPT. MHD-1
R. K. LeBlond Machine Tool Co., Cincinnati 8, Ohio
Gentlemen:
Please send me illustrated Bulletin describing LeBlond Sliding Bed Gap Lathes.

Name_____
Firm_____
Address_____

LeBLOND

LARGEST MANUFACTURER OF A COMPLETE LINE OF LATHES

s a
big
the
ith
It
arn

o",
the
ne
K.
ch

ATHES